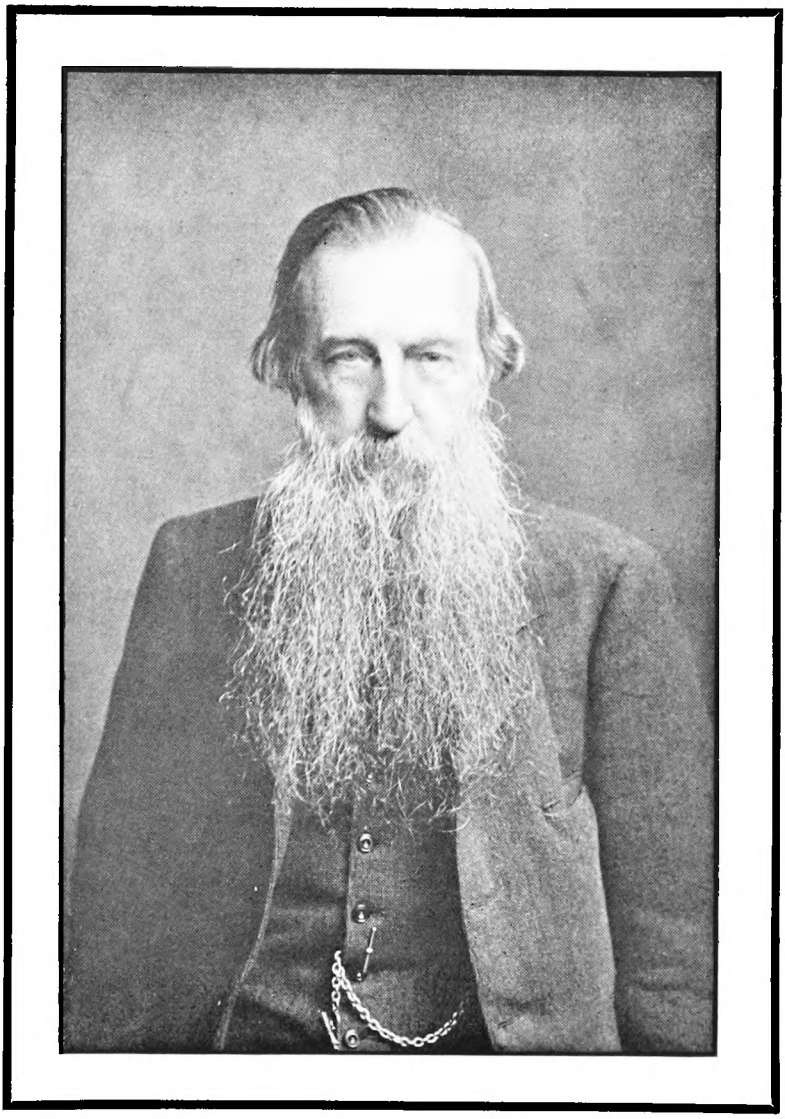

ALEXANDER BUCHAN, M.A., LL.D., F.R.S.,

Born 11th April, 1829—Died 13th May, 1907.

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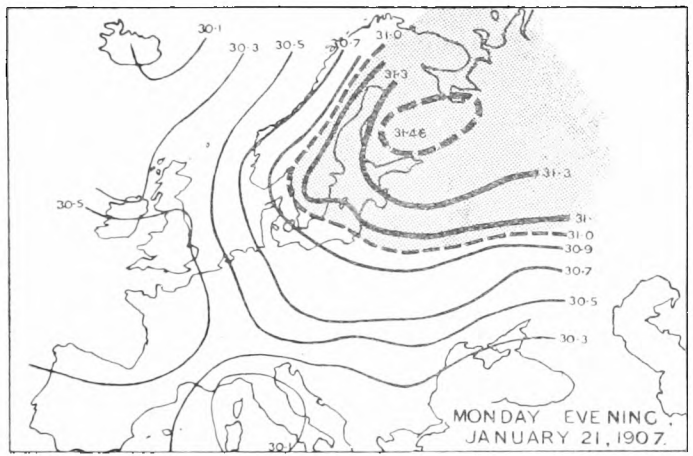
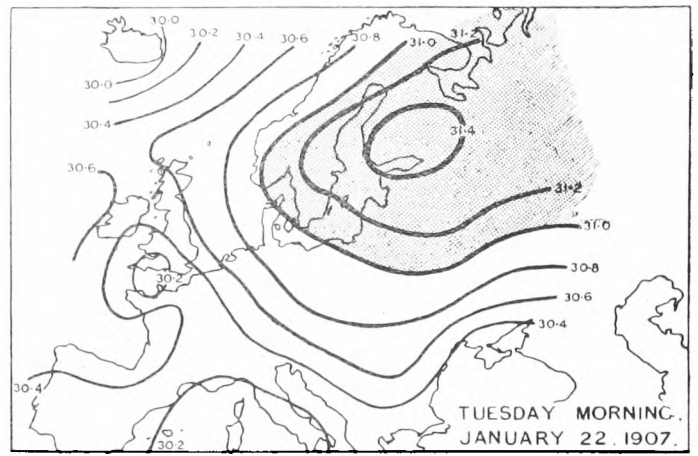
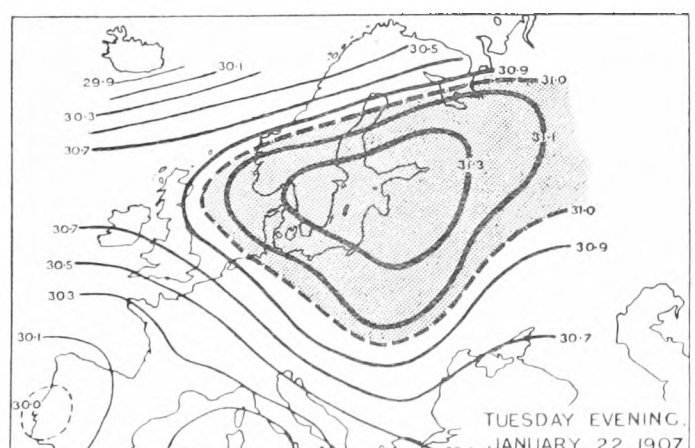
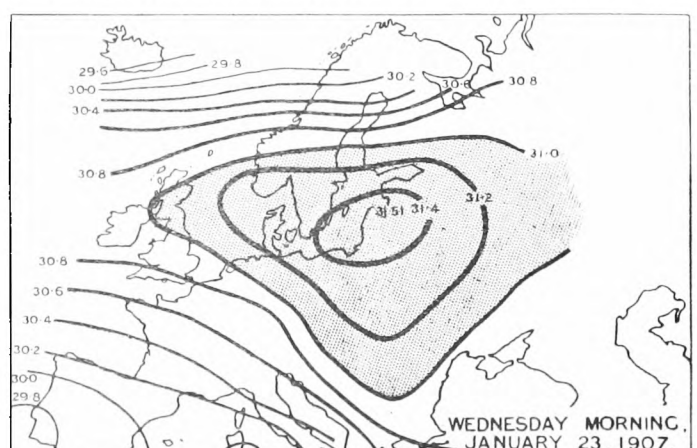
THE HIGH BAROMETER OF JANUARY, 1907.









[*Face p.* 1.

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No. 493. FEBRUARY, 1907. Vol. XLII.

THE HIGH BAROMETER OF JANUARY, 1907.

By R. G. K. Lempfert, M.A.

The month of January, 1907, has established a record for high barometric readings which is probably, in its way, unprecedented in the annals of meteorology. The Daily Weather Report issued by the Russian Meteorological Office for Wednesday, January 23rd, records the reading 799·8 mm. at Pernau, on the Gulf of Riga, at the hour of evening observation on the previous day and a reading of like magnitude at Riga on the morning of the 23rd. 799·8 mm. is equivalent to 31·49 English inches, and if, as seems probable, the correction for reducing to latitude 45° has not been applied in the Russian Report, the finally corrected pressure value would be **31·51 in.**, the reading adopted in the report issued by the Bureau Central Météorologique of Paris.

The highest pressure, reduced to sea level, which has been observed on the face of the globe is, we believe, 31·72 in. recorded at Irkutsk in December, 1896. The present readings are thus less than the "record" by about 0·2 in. It should, however, be borne in mind that the Siberian station is several thousand feet above the level of the sea, so that the unreduced pressure value, as read off by the observer, was less than 31·7 in. by several inches. Both Pernau and Riga are on the shores of the Baltic, and the corrections for reduction to sea level are very small. We may therefore regard the readings quoted above as pressures actually experienced. From this point of view 31·51 in. probably establishes a new "record" in meteorological data.*

The distribution of pressure from the evening of January 21st to the morning of January 23rd is shown on the accompanying maps (see Plate facing p. 1). In each a large area is included within the space bounded by the isobar of 31·0 in. At 8 a.m. on the 23rd the pressure exceeded this limit over a large portion of Great Britain and a small district in the north-east of Ireland. The highest reading in the British Isles was reached at Aberdeen, at 10.15 a.m. on January 23rd. At this hour the Observatory barometer showed 30·957 in. at station level, which corresponds with 31·06 in. at mean

* See also this Magazine, Vol. **34** (1899), p. 81.

sea level. This falls short of Aberdeen's previous record, which happens also to be the record for the British Isles, by only ·05 in.*

The history of the advance and development of the anticyclonic system shows some interesting features. Pressure had been over 31 in. over the north-west of Russia since the morning of the 20th, and during the following days it continued to increase steadily. On the evening of January 21st the highest reading was 31·46 in. in the centre of Finland, and the anticyclone had extended westward to the shores of the North Sea. Fresh or strong south-easterly winds were blowing on the Dutch, German and Danish coasts. The British Isles and the west of France were under the influence of an independent anticyclone, in which the highest readings were over the Bay of Biscay. The wind at the British stations was westerly or north-westerly. A trough of low pressure, extending in a south-east to north-west direction across the North Sea, separated the two opposing wind circulations. During the night the situation underwent a complete change. At 8 a.m. on January 22nd the oceanic anticyclone had receded beyond the west coast of Ireland, while the continental system had spread westward and set up easterly winds at all our east coast stations. A "depression," with a minimum reading of 30·24 in., covered the mouth of the English Channel.

The distribution of pressure on the evening of January 22nd and the morning of the 23rd, when the anticyclone attained its greatest intensity, may be seen in the accompanying maps. Steep gradients established themselves to the north and south of the region of highest pressure. A plentiful supply of warm air was accordingly carried from mid-Atlantic, past the north of Scotland, to the coast of Norway, while cold air, passing along the southern slope of the anticyclone, was brought from central to western and southern Europe. A most striking distribution of temperature resulted. At 8 a.m. on January 23rd the reading in the Färoe Islands was 46°, identical with that at Palermo. At Riga the thermometer stood at −22° F. and sharp frost prevailed over the greater part of southern Europe. At Rome the reading was 33°, or 6° lower than that at Bodoe, within the Arctic circle.

A south-westerly gale in the extreme north-west brought very warm air from southern latitudes to the neighbourhood of Iceland. The reading reported from Seydisfjord was as high as 59°, which is 1° higher than the simultaneous reading at the Azores, where the wind was northerly, and more than 10° higher than the readings on the coast of Algeria and Tunis. The possibility of telegraphic errors in the reports must be borne in mind, but equally high winter temperatures have been observed in Iceland under similar conditions in previous years. On the following day (January 24th) the wind veered to the north of west and the temperature fell rapidly to 29°.

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* See also this Magazine, Vol. **37** (1902), pp. 5, 27.

Towards the end of the week the anticyclone moved slowly to the south-eastward and decreased in intensity. On the evening of Friday, January 25th, the region of highest pressure had been transferred to Asia Minor; the highest readings were still above 31 in.

WEATHER WHIMS.—I.

THE BUTTERFLY-HYGROSCOPE.

By Richard Inwards.

This philosophic toy is made from the seed of the Egyptian wild oat, see fig. 1. It will be observed that the seed is furnished with long awns, and that the thicker portion, or what may be termed the thigh, is twisted, and is in all probability a modified leaf. But this part of the plant is highly hygroscopic and twists or untwists with the changes in the dampness of the air, so that it can be used to actuate the wings of the butterfly, see fig. 2, where the awn is seen fastened down by passing through the head of a small screw fitted with a shallow wing-nut in a recess cut in the wooden support. The left wing only is shown, and it is obvious that the awn which works the right wing must be placed in the opposite direction, or pointing towards the head.

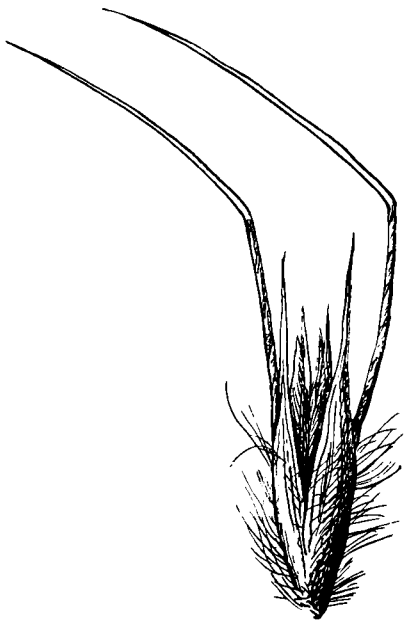


Fig. 1.

The wings are of paper, painted in water colours, and the hinges, which must work with very little friction, consist of holes through which pieces of fine wire pass freely—each wing must be a separate piece of paper. It is best to set the wings on a very damp day, when, after loosening the screws, the wings may be pressed together in a vertical position, and the screws lightly turned so as to hold them there. They will then open as soon as a drier state of the air sets in, and generally indicate by their position the moisture of the atmosphere. The butterfly should be hung on the wall in a passage, where there is no fire and where there is access to the open air. It is too fragile to work out of doors.

The hygroscopic property is doubtless a provision of nature to enable the seed to plant itself, for the action of the changes of

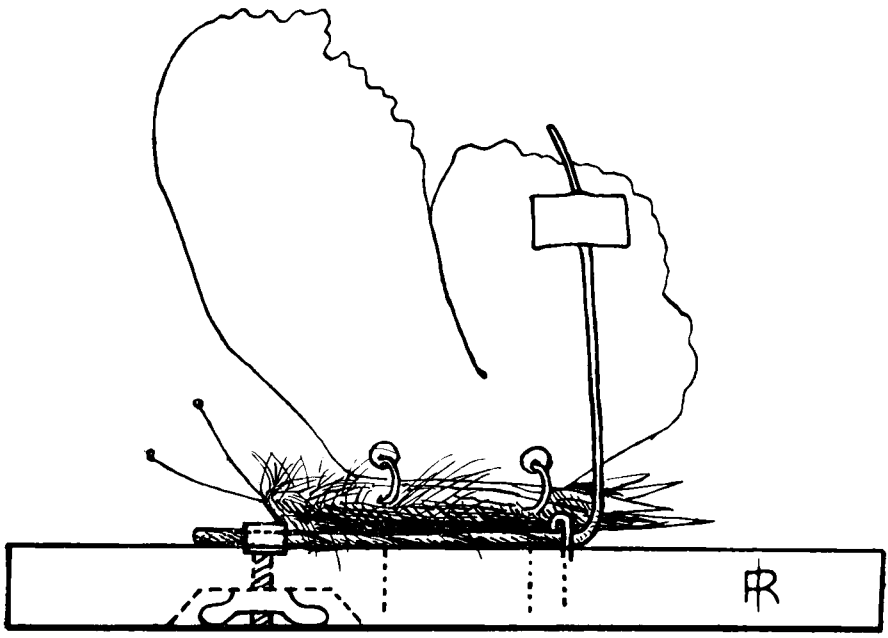


FIG. 2.

moisture being to twist and untwist the awn, and as the hairs and minute spines on the seed prevent it ever going backwards ; as soon as it gets its pointed end in any sort of moist hole or crevice, the turning about of the legs by pressing against any objects such as stones, or straws, or even against the ground itself, effectually plants the seed. If a number of the seeds are placed in a paper box with holes near the bottom it will not be long before half a dozen of the seeds are making attempts to get through the holes. It is diverting to see the behaviour of the seeds when the thighs are wetted. They twist slowly, and roll over and sometimes when the legs get entangled the seeds leap several times their own length, from the sudden releasing of the touching parts. The hygroscopic substance seems to be a grayish matter rolled up in the interior of the awn. Perhaps some chemist will tell us what it is.

THE LANDER RECORDING RAIN GAUGE.

A LANDER self-recording rain gauge has been tested at Camden Square during the greater part of the past year. The results have been compared with those of other automatic gauges of approved patterns and have generally been found to accord closely. There were few

opportunities of observing the gauge in conditions of real difficulty such as are presented in torrential rain of short duration and great amount. The one heavy rain was that of June 28th, 1906, but though 2·21 in. fell on that occasion it was spread over $8\frac{1}{2}$ hours.

The instrument is of simple construction, having a funnel of the Snowdon pattern connected with a chamber containing a float which carries a recording pen moving upward between vertical guides. A continuous record is made upon a drum which may rotate daily or weekly. When an inch of rain has fallen the water reaches the bend of an open syphon, which starts without any mechanical device and empties the chamber in about 15 seconds. Although the objections to syphon action in recording gauges are numerous, we observed no instance of failure with the Lander gauge, though it must be stated that there was no opportunity of observing a discharge during torrential rain. A distinct advantage of this gauge is that it records the fall of a whole inch of rain before discharging and the liability to failure is thus greatly reduced, as rains of such an amount as to require more than one discharge are rare. There is an efficient heating arrangement for preventing damage in frost.

Our only real difficulty was with the clock, the time-keeping of which left something to desire, and the gearing was not altogether satisfactory. We should prefer to pay more for the instrument and have a clock of superior quality, for the condition of exposure to the variations of temperature and humidity is a very severe one. It is probably difficult to get a clock that can stand the test of a week's run in the open air without going seriously wrong, and for this reason we very strongly recommend the use of a drum which revolves in twenty-four hours instead of seven days. It is not necessary to change the paper daily, but the pen should be set to the correct time each morning. We can recommend the gauge when fitted with a daily drum to any observer who will not grudge a little care in setting and regulating the clock. The extremely moderate price brings this gauge within the reach of many to whom the cost of such gauges has hitherto been prohibitive.

It cannot, however, be too strongly pointed out that recording gauges of whatever pattern should never supersede the ordinary gauge for the measurement of amount, as however carefully attended to the liability to a failure of the mechanism always exists and the continuity of a record may be broken unless the observations are supplemented by those of an ordinary gauge.

A READERSHIP IN DYNAMICAL METEOROLOGY.

WE have much pleasure in giving publicity to the following important communication from the Meteorological Office :—

The Meteorological Committee are enabled by a private donation to appoint a Reader in Dynamical Meteorology, to hold office from October 1st, 1907, or such earlier date as may be arranged, under the following general conditions :—

1.—The Readership will be of the annual value of £350, and will be tenable for three years at any British University that may be approved for the purpose, and affords the required facilities.

2.—Candidates must produce evidence of being able to carry out original investigation of a mathematical character.

3.—The duty of the Reader will be primarily to promote the Science of Meteorology by mathematical investigation, and he will be expected to give annually a short course of about twelve lectures.

Further details may be obtained from the Director of the Meteorological Office, 63, Victoria Street, London, S.W.

Applications should be sent to the Director not later than 1st March, 1907, and should be accompanied by references, but no testimonials should be sent.

The further details referred to above are as follows :—

1.—The Readership is to be of the value of £350 per year, for three years, payable quarterly, and to be awarded by the Meteorological Committee. The appointment will date from the 1st October, 1907, or such earlier date as may be arranged by the Committee.

2.—The Readership is to be tenable at the University of Manchester, or such other University in the United Kingdom as may be approved by the Meteorological Committee, and may be willing to recognise the Reader as a Reader or Lecturer of the University.

3.—One term's residence during each academic year shall be required at the University concerned. The Reader will be expected to give one course of not more than twelve lectures, suitable for students of Physical Science, during each of the three years, provided that during the first year of his tenure he may be excused from the duty by the Meteorological Committee.

4.—The Reader is to devote the remainder of his time to study and research. He shall make himself acquainted with the work of the British Meteorological Office, and if possible with that of the meteorological establisements of one or more of the British colonies or dependencies, or of foreign countries. He may give at his option a course of post-graduate lectures on the subject of his research, provided that the total number of lectures given by him shall not exceed thirty in any one year. He may be called upon from time to time to furnish reports on the progress of his work.

5.—The readership is to be tenable simultaneously with any University or College Scholarship or Fellowship, provided that the duties attached to the emolument are not such as to interfere with the duties of the readership.

6.—The reader shall at the end of his term of office furnish a report to the Meteorological Office on the present methods of conducting and reducing meteorological observations.

7.—He shall also furnish during his tenure, or within a reasonable time

after the conclusion of his tenure, papers embodying the results of his researches. Such papers shall be submitted in the first instance to the Royal Society of London for publication.

8.—The following are suggested as subjects of investigation, but the Reader may submit any other subjects for approval of the Committee :—

The extension of Lord Rayleigh's investigation of the free vibration of the atmosphere (Scientific Papers, Vol. III., page 335) and its connection with the general theory of the diurnal variation of the barometer.

The dynamics of the motion of air represented by the trajectories of air in travelling storms. (See "Life History of Surface Air Currents," Meteorological Office Publication, No. 174).

The physical processes which may account for the sudden and almost discontinuous changes of pressure propagated with the velocities observed in the case of "line squalls."

Vortex motion in a uniformly rotating basin, treated with a view to possible application to the physics of the atmosphere.

9.—The Meteorological Committee reserve the right of making no appointment in default of suitable candidates.

10.—The Readership shall be vacated by (1) three months' notice by the holder of the office; (2) three months' notice by the Committee on the ground that the duties of the readership are not being duly performed; (3) by the acceptance of an appointment which in the opinion of the Committee interferes with the duties of the readership.

Adam F. W. Paulsen.

(1833–1907).

PROFESSOR A. F. W. PAULSEN, director of the Danish Meteorological Institute, died at Copenhagen on January 11th, at the age of 74. After winning a reputation as a physicist he devoted the latter part of his life to meteorology, in which sphere his talents were rendered the more useful by the wide area of ocean and polar sea embraced by the operations of the Danish Meteorological Institute. Among his important work in connection with the meteorology of the sub-polar regions may be mentioned his study of the aurora borealis. As recently as 1899 he took command of an expedition sent out by the Danish Government with the object of studying this interesting phenomenon, and an account of this was laid before the British Association at Southport in 1903.

A monument to the life-work of Professor Paulsen is the permanent telegraphic communication now established between Iceland and the mainland of Europe, by means of which vast service has been, and will doubtless yet be, rendered to meteorological knowledge. He also devoted much attention to the connection between the meteorological conditions of Greenland and those of Europe.

Professor Paulsen was a member of the International Meteorological Committee, and was frequently in attendance at international and other scientific gatherings. We owe a tribute also to his genial kindness in receiving foreign visitors at the Institute over which he presided in Copenhagen.

ROYAL METEOROLOGICAL SOCIETY.

THE annual general meeting of this Society was held on Wednesday evening, January 16th, at the Institution of Civil Engineers, Westminster, Mr. Richard Bentley, President, in the chair.

The Council in their Report referred with satisfaction to the marked and increasing interest in Meteorology which has been apparent throughout the country. The scheme of lectures to local societies has proved successful, and there is reason to hope that it will lead to a substantial advance in the study of those scientific principles which it is the duty as well as the privilege of the Society to promote. The number of Fellows on the roll has been well maintained.

The Report having been adopted, the thanks of the Society were given to the Council and to the Auditors for their services, and also to the President and Council of the Institution of Civil Engineers for permitting the Society to hold its meetings at the Institution.

The President delivered an Address touching on the effects of "Weather in Warfare," in the course of which a large number of campaigns, sieges and battles were reviewed, and the influence of wind upon weapons and vessels in the early days of war dwelt upon. Many invasions in the days of small craft were frustrated by stormy weather from the time of Xerxes to those of the various Spanish Armadas sailing in succession to these shores; but now, with large vessels, good charts and instruments, storm warnings, and, above all, steam, this disability has passed away, and wind has ceased to be of as much importance as formerly, unless indeed hostile operations are transferred to the air itself. Restrictions of seasons were also illustrated in the attack on the Bocca Chica, on Buenos Ayres, in the siege of Louisberg, the terrible retreat from Russia, and in the operations on the Gold Coast. Fog has constantly been present during the operations of war, most frequently perhaps on land, though the sailors had their share at Barfleur, Cape St. Vincent, and before Tsushima. Indeed, on one memorable occasion, the *Centurion*, with Lord Anson on board, sailed through the French fleet undetected. Three great men lost their lives through fog, Sir Philip Sidney at Zutphen, Gustavus Adolphus, the Lion of the North, at Lützen, and the hard-fighting Scot, Marshal Keith, in the Seven Years' War. The result of the battle of Barnet was also due to fog, and Frederick the Great was misled by it at the battle of Lowositz. The part played by rain, too, is an important one in history, from the loss of Varus's legions in Westphalia down to the destruction of the Duke of Tarentum's army in Silesia. The siege of Vienna by Solyman failed through rain. Napoleon was defeated at Caldiero from the same cause, and General Lee's operations in 1863 during the American Civil War were hampered by it. Reference was also made to the passages of the Alps in snow from Hannibal's time to that of Napoleon, to the march of the Sikhs to relieve Chitral, and to

the snowstorms at the battles of Hohenlinden and Eylau, and during the French retreat from Russia. Ice appeared favourable to military operations, though it was employed for the defence of the Balkan passes, and in 1800 in the Tonale Pass on the Italian frontier the Austrians made use of it in cubes to build forts, which turned out to be impregnable. Charles the Tenth crossed from Sweden on the frozen Baltic to invade Denmark, and General Pichegru overran Holland in 1795 when its rivers and canals were frozen, and even captured the Batavian navy by sending his cavalry to sea—when their horses' feet were roughed—over the ice. Illustrations of campaigning under the difficulty of great heat were given from the time of the great Captain Gonsalvo de Cordova to Sir Charles Napier in Sind, and Lord Strathnairn in India, or to the recent battle of Yosherei in 1904. The destruction of Cambyses in a simoon and of the Emperor Julian in his Persian campaign were also alluded to. Two earthquakes during the last century occurred in sieges (at Patras, and at Jellalabad), and one happened during the battle of Trasimene. Several engagements took place in the height of gales, such as Admiral Hawke's victory at Quiberon and Admiral Rodney's off the Spanish coast. Towton, a snowstorm; Falkirk, rain; Culloden, wind; and Solferino, a whirlwind and thunderstorm, were further instances. Other interventions of the weather were noticed —the mirages which haunted the exhausted French troops in the desert, the lowering of the Baltic and of the Sea of Azof in special winds, which permitted the fortress of Stralsund and the celebrated lines of Perekop to be captured, and also the Isle of Ely in drought.

A hearty vote of thanks was given to Mr. Bentley for his services as President and also for his address.

The following were elected the Officers and Council for 1907 :—*President*, Dr. H. R. Mill; *Vice-Presidents*, Mr. R. Bentley, Capt. W. F. Caborne, C.B., Mr. E. Mawley, and Sir J. W. Moore, M.D.; *Treasurer*, Dr. C. T. Williams; *Secretaries*, Mr. F. C. Bayard and Mr. H. Mellish; *Foreign Secretary*, Dr. R. H. Scott, F.R.S.; *Council*, Col. J. E. Capper, C.B., Mr. J. E. Clark, Capt. M. H. Clarke, Mr. R. H. Curtis, Dr. H. N. Dickson, Mr. W. H. Dines, F.R.S., Mr. F. Druce, Mr. W. Ellis, F.R.S., Capt. M. W. C. Hepworth, C.B., Mr. R. Inwards, Mr. B. Latham and Dr. W. N. Shaw, F.R.S.

Mr. Bentley having vacated the chair, it was taken by Dr. H. R. Mill, the newly-elected President, who thanked the Fellows.

During the evening the following gentlemen were elected Fellows of the Society :—Col. A. Bibby, Mr. C. S. Bilham, Mr. B. L. Bradley, Col. H. Burton, Mr. K. Chowdry, Mr. E. G. Crocker, Capt. C. Etti, Mr. R. Falcon, Mr. W. C. George, Mr. H. T. Gibson, Mr. E. O. Gilbert, Mr. H. F. Kingdon, Gen. H. Le Cocq, Mr. J. W. Lovibond, Mr. C. W. Mallins, Mr. L. Miles, Lord Montagu of Beaulieu, Mr. M. Morgan, Mr. D. L. Richardson, Mr. E. S. A. Smith and Mr. M. W. Zambra.

Correspondence.

To the Editor of Symons's Meteorological Magazine.

AUDIBLE METEORS.

THE observations of audible or detonating meteors present some difficulties, but these disappear when we consider the circumstances involved and put a fair and natural construction upon the facts.

Ordinary detonating fireballs are not very rare, and a good many instances have been recorded in scientific journals. The sound usually comes several minutes after the meteoric explosions (the time-intervals varying, of course, with the distance), the velocity being about 12 miles per minute.

The noise accompanying the actual descent of meteorites to the earth is different, for in many cases it precedes or accompanies the observed object when the latter falls near the spectator. We should expect this, because these celestial stones have a comparatively slow rate of speed. Descending vertically, or nearly so, and penetrating the soil to the extent of only 12 or 18 inches, it is certain the velocity cannot have exceeded that of terrestrial bodies, and it has been computed in several well-known instances that it amounted to only a few hundred feet per second. The planetary speed of these objects is effectually checked by atmospheric resistance, and they fall to the ground in nearly perpendicular directions, the Earth's attraction upon them having a great influence in the closing stages of their careers. In cases, therefore, of meteorites, the falls of which are actually witnessed, we naturally infer that the noise attending them will reach the observer's ear before the objects attract his eye, because sound travels faster than the bodies themselves.

But in regard to the hissing and similar noises often alleged to have been heard *simultaneously* with the passage of *ordinary* shooting stars and fireballs athwart the sky, these may be dismissed as imaginary. It is true that some of the observations appear to be of a remarkable and significant character. But when we reflect upon the mistakes often made by inexperienced persons in recording cosmical phenomena of unexpected and startling kind, it becomes easy to explain the anomalies presented. Some people have averred that on hearing a peculiar hissing sound, and looking up to ascertain the cause, they have seen a bright meteor rushing across the sky. In such cases the hissing must either have proceeded from a terrestrial source or have been a false sensation, the objects having been more than 100 miles distant from the observers according to reliable calculations subsequently made. Others have distinctly heard the residual particles of exploded meteors pattering on the trees close to them, while others again in various cases have detected a strong smell of sulphur instantly after meteoric disruptions, yet it has been proved by ample data that the spectators who received

such curious impressions were between 100 and 200 miles distant from the objects supposed to have caused them.

We have to allow a wide scope for observational illusions, not only in meteoric but in many branches of astronomy. And one of the most palpable of these illusions is the supposed hissing sometimes stated to accompany ordinary meteor-flights.

W. F. DENNING.

Bristol, Jan. 19, 1907.

MR. BROOK asks me (on page 231 of the January number) to explain how Mr. Huntley heard the sound before he saw the meteor. The answer is tolerably obvious if Mr. Huntley's language is attended to. He was not looking up until his attention was attracted by the sound. Then looking up he saw it still moving on. The sound had reached him from the nearest point in its path; but he did not see it until it had passed that point. The explanation suggested in the second paragraph of Mr. Brook's letter is inconsistent with the fact he recalls; for Mr. Huntley was startled, not by the sight of the phenomenon, but by the sound of it; and therefore could not have imagined the latter. The duration of the incandescence of the particles left by the meteor was sufficiently long to permit it to be looked for after the cause of the sound had passed away.

Mr. Brook, after admitting that meteors do emit sound, quotes Mr. Denning as if he had denied that they do. I do not so read the extracts; nor would I attribute such an opinion to him in the face of the conclusive evidence in the extracts I referred to in my last letter. Nor, apparently, has Mr. Brook seen Mr. Fordham's paper to which I referred as to the meteor of 1887, or he would have found that Hertford lay outside the area of shock as well as of sound, and 20 miles from the point of the explosion seen from there and heard near Brackley.

My own belief is that the sound of many more meteors would be noticed if observers would have the patience to wait at least two minutes before starting to discuss what they have seen.

JAMES G. WOOD.

January 22, 1907.

DIURNAL VARIATIONS OF PRESSURE.

IN the January number of your Magazine (Vol. **41**, p. 233) you speak of "The regular diurnal variation in atmospheric pressure, in and near the Tropics." Is it *only* in and near the Tropics?

I remember in the long drought of 1887, we daily hoped for rain, from noticing a slight daily fall of the glass. It rose as regularly. I remarked on our disappointment to a sailor visiting us. He replied, "Oh, that is the tidal motion of the air; air has tides like water." I gathered that it was only in still weather we could observe

this slight movement, and that our latitudes have too stormy an atmosphere, in general, for the tidal movement to show.

On p. 227 of your Magazine it is said: "The oscillations (of the barometer) in high latitudes are much greater than those in the Tropics," where diurnal variation is observed.

I should like to know if air tides really exist. There seems no reason why the fluid air should not respond to the attraction of the sun and moon, as fluid water does, only air is more easily moved by local disturbances, which might obscure the daily rise and fall. Would there be two daily tides?

L. J. B. G.

18th Jan., 1907.

[The writer of the above letter is quite right in laying a questioning finger on the sentence quoted. Diurnal pressure changes may be detected in settled weather in any part of the world; but in the Tropics they form the most striking feature of the barometric curve except in the rarest cases. The constancy of the hours of the daily maximum and minimum point to the phenomenon in question being a result of thermal changes; were they due to gravitational causes the hour would change from day to day in accordance with the lunar phases, as hours of high and low water do. No doubt the differential attraction of the sun and moon raises tides in the air as in the ocean; but the amount of the tidal range in the atmosphere is so small and the incidental variations of pressure, due, *e.g.*, to the passing of clouds influencing temperature, are so great that the tidal effect is masked.—ED., *S.M.M.*]

HIGH BAROMETER—HALO.

ON January 23rd the reading of the barometer at 9 a.m. was 31·008 inches, and was probably a few thousandths higher between 10 a.m. and noon. This is the highest since 1878 except that of January 9th, 1896, and the sixth during the same period above 30·900. How is it that these extreme pressures have been so much more frequent in recent years?

On January 26th, from 2.40 p.m. for about 20 minutes, I saw a fine example of the circumzenithal halo; it extended for about one-sixth of the circumference of a circle of radius from 15° to 20° with the zenith as centre. The prismatic colours were fully developed, the red being nearest the sun. At the same time appeared a coloured parhelion, on the east side of the sun and about 22° distant, with a faint white tail directed from the sun for about 5°. There was no trace of any other halo, and clouds obscured the whole phenomenon at 3 p.m.

CHARLES L. BROOK.

Harewood Lodge, Meltham, Huddersfield, Jan. 31, 1907.

SUNSHINE RECORDER.

I HAVE read the letters *re* above on pages 168 and 188 of this Magazine in last year's volume.

I should attach special weight to Mr. Jordan's words as he is perhaps the pioneer of Photographic Sunshine Recorders, and speaks with undoubted authority. I have always understood that the primary objection to the Jordan Recorder has been the want of uniformity in the sensitiveness of the paper employed, and hence of the relative values of sunshine records taken at different periods. If this has been overcome it is a distinct step in advance.

Mr. Lander's statement that he has found a perfectly reliable paper, of uniform sensitiveness and of good keeping qualities, will be received with satisfaction by all who are interested in sunshine records; and it should lead to a fresh series of comparisons of records made with the Jordan, Lander, or other photographic instruments, and the Campbell-Stokes pattern. The results should go far to settle the question of the relative merits of the various instruments, and lead to general adoption of the instrument which appears to give the most accurate results.

I cannot, without confirmation, accept Mr. Lander's statement that a summer mid-day exposure of the chart in a Campbell-Stokes instrument for ten seconds will give a record of nearly ten minutes. On either side of the position of intensity one might find an elongated brown trace, but no one used to the Meteorological Office method of measurement would regard such as a measure of bright sunshine; allowance is always made in measuring the daily curves, whether of continuous, or intermittent sunshine, for lateral extension of trace.

Mr. Lander's reproduction of sun trace for April 27th is scarcely one that I should accept for the determination of the question. Unless it is a very poor reproduction it suggests an instrument out of focus. The lack of uniformity in the width of the trace and the blurring are such as I have not experienced with the Campbell-Stokes instrument, and would tend to an uncertainty in the time value of sunshine such as I should not expect to meet with.

From the experience of Mr. Jordan and Mr Lander, together with that of gentlemen long used to the Campbell-Stokes instruments, one is led to hope that at no very distant date we may in the matter of sunshine measurement attain to *uniformity with accuracy.*

Falmouth Observatory, 12th February, 1907. EDWD. KITTO.

SOLAR HALO ON JANUARY 4th.

A REMARKABLE halo was seen here during the afternoon of January 4th. I first noticed it at 2 p.m., when arcs of prismatic colour appeared on each side of the sun, the height of the sun above the horizon being then nearly equal to the distance of the arcs from the sun. These arcs gradually lengthened, the coloured portions remaining as they were, till about 3 p.m. there was a circle, complete

except close to the horizon, of white light, with a third patch of colour towards the zenith. The circle was barely visible after 3.30, but the patch of colour to the W. of the sun remained till close to sunset.

There was also a particularly brilliant and perfect lunar halo for several hours on the evening of December 29th.

H. A. BOYS, F.R.Met.Soc.

North Cadbury Rectory, Somerset, Jan. 5, 1907.

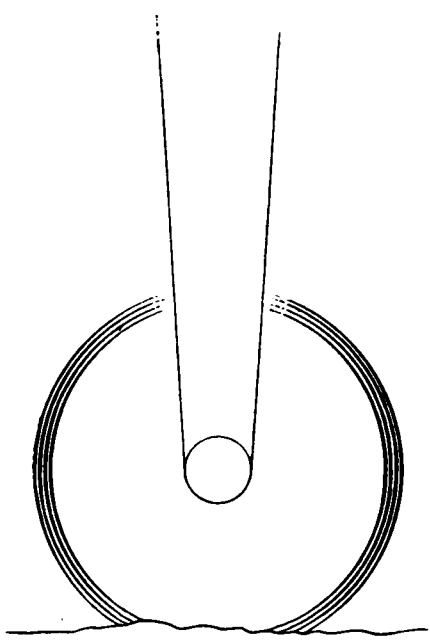
THIS afternoon I saw a very fine halo round the sun. I saw it first at 1.30 p.m. and off and on until 3.30, when it was very distinct, but disappeared about 3.45, when the clouds hid the sun. It was coloured like a rainbow, the colours being much more distinct at the highest point and at the extreme right and left; I could not see the lowest point.

When the lowest point was about on the horizon the highest would be nearly halfway to the zenith. There was no appearance of false suns in the halo, the points I have spoken of being merely brighter in colour than the rest of the halo.

I spend a good part of my time out of doors, and I notice most things that are to be seen, but I have only once before seen a solar halo, about seven or eight years ago, in the winter and late in the afternoon.

T. LAMBERT HALL.

Dilwyn, January 4th, 1907.



Solar Halo January 4th 1907.

THERE was a magnificent halo round the sun here to-day. I noticed it first at 2.30 p.m. At that hour the circle seemed about 33° from the sun's disc, and was red on the inner side, light yellow in the middle, and violet-blue on the outside. What struck me most was a very light, I might almost say white, streak from the sun's disc upwards, quite hiding the ring, apparently 3 or 4 degrees. This remained until about 3.45 p.m., when the bright streak died out and left the circle above the horizon complete. At 4 p.m. all had disappeared. It was bright sunshine all day. Wind S.W., light. Thermometer at 9 a.m. showed a minimum of 30° and a maximum of 43°.

JESSE REEVES.

Heathfield, Purlieu, Southampton, January 4th, 1907.

METEOROLOGICAL NEWS AND NOTES.

DR. W. N. SHAW, Director of the Meteorological Office, has been appointed Reader in Meteorology in the University of London.

SIR CHARLES TODD, for fifty years the head of the Meteorological Service of South Australia, has retired, still well and hearty, at the age of eighty, and has been succeeded, we understand, by Mr. R. F. Griffith, who has long taken a leading part in the meteorological work at Adelaide Observatory.

AN OCEANOGRAPHICAL LABORATORY, under the direction of Mr. W. S. Bruce, was opened on January 16th in Edinburgh by the Prince of Monaco. The laboratory is united with a museum of polar and marine natural history, and will be occupied in the first instance, we understand, in preparing the results of the Antarctic expedition in the *Scotia* for publication.

THE IMPERIAL-ROYAL GEOGRAPHICAL SOCIETY OF VIENNA celebrated the fiftieth anniversary of its foundation on December 4th in a special meeting presided over by H.I.H. the Archduke Rainer, at which the Honorary Membership of the Society was conferred on representatives of various departments of Geography, amongst whom the following have been associated mainly with meteorological or oceanographical work: Prof. F. A. Forel of Geneva, Prof. G. Hellmann of Berlin, Dr. H. R. Mill of London, Sir John Murray of Edinburgh and Dr. A. Voiekoff of St. Petersburg.

MR. WILLIAM MARRIOTT was presented at the Annual General Meeting of the Royal Meteorological Society with an illuminated Address in recognition of his services as Lecturer for the Society. The Address, which was signed by the individual members of the Council of the Society, ran as follows:—

"The first course of lectures and exhibitions given on behalf of the Royal Meteorological Society having proved so popular as to lead to a further continuance, the Council of the Society avail themselves of the opportunity of placing on record their appreciation of the able manner in which MR. WILLIAM MARRIOTT performed the duties of Lecturer and Demonstrator, which contributed greatly to the success of the scheme. The Council desire at the same time to acknowledge the zeal and interest Mr. Marriott has shown at all times in the affairs of the Society, his many valuable contributions to the Journal and to the other publications of the Society during so many years, and also the courteous manner with which he has placed his knowledge and long experience at the service of observers in all parts of the country."

"THERMOMETER READINGS BELOW ZERO have been the order of the day and night," observed a local paper of the winter of 1906–7, while a meteorological observer in the same town writes to us:—"How little frost we have had this winter; it must be almost a record for the absence of severe cold." It is a relief to find by reading farther that the journalist treated "32° F." and "zero" as synonyms, and an apparent example of appalling mendacity is reduced to an instinctive feeling of the appropriateness of the point of departure of the thermometer scales not used in England.

TEMPERATURE FOR JANUARY, 1907.

STATION.	COUNTY.	Lat. N.	Long. W. [*E.]	Height above Sea. ft.	TEMPERATURE. Max. °	Max. Date.	Min. °	Min. Date.	No. of Nights at or below 32 Shade.	Gra
		° ′	° ′							
Camden Square	*London*	51 32	0 8	111	51·4	1	22·1	24	11	20
Tenterden	*Kent*	51 4	*0 41	190	50·0	1, 17	16·5	24	11	21
West Dean	*Hampshire*	51 3	1 38	137	50·0	1	19·0	24	15	21
Hartley Wintney	,,	51 18	0 53	222	52·0	12†	20·0	18, 27	17	21
Hitchin	*Hertfordshire*	51 57	0 17	238	50·0	1	20·0	25	15	...
Winslow (Addington)	*Buckinghamshr.*	51 58	0 53	309	51·0	13	17·0	25	17	23
Bury St. Edmunds (Westley)	*Suffolk*	52 15	*0 40	226	50·5	15	20·0	24‡	14	...
Brundall	*Norfolk*	52 37	*1 26	66	48·8	12	14·8	27	14	16
Winterbourne Steepleton	*Dorset*	50 42	2 31	316	50·2	1	16·0	25	10	15
Torquay (Cary Green)	*Devon*	50 28	3 32	12	52·1	1	24·7	25	5	9
Polapit Tamar [Launceston]	,,	50 40	4 22	315	51·8	1	22·0	24	6	14
Bath	*Somerset*	51 23	2 21	67	52·8	1	20·1	25	12	...
Stroud (Upfield)	*Gloucestershire*	51 44	2 13	226	48·0	1, 8	21·0	24, 25	15	...
Church Stretton (Woolstaston)	*Shropshire*	52 35	2 48	800	49·0	1	7·0	25	31	...
Bromsgrove (Stoke Reformatory)	*Worcestershire*	52 19	2 4	225	51·0	12	10·0	24	22	...
Boston	*Lincolnshire*	52 58	0 1	25	48·0	12	15·0	25	16	...
Worksop (Hodsock Priory)	*Nottinghamshire*	53 22	1 5	56	51·5	12	14·7	25	17	29
Derby (Midland Railway)	*Derbyshire*	52 55	1 28	156	51·0	12	13·0	24	16	...
Bolton (Queen's Park)	*Lancashire*	53 35	2 28	390	49·7	1	17·0	25	9	18
Wetherby (Ribston Hall)	*Yorkshire, W.R.*	53 59	1 24	130	...	...	...	...	...	...
Arncliffe Vicarage	,, ,,	54 8	2 6	732	...	...	...	...	...	...
Hull (Pearson Park)	,, *E.R.*	53 45	0 20	6	50·0	12	19·0	25	15	29
Newcastle (Town Moor)	*Northumberland*	54 59	1 38	201	...	...	...	...	...	...
Borrowdale (Seathwaite)	*Cumberland*	54 30	3 10	423	49·6	12	19·4	24	11	...
Cardiff (Ely)	*Glamorgan*	51 29	3 13	53	...	...	...	...	...	...
Haverfordwest (High Street)	*Pembroke*	51 48	4 58	95	51·6	7	14·7	25	5	8
Aberystwyth (Gogerddan)	*Cardigan*	52 26	4 1	83	49·0	1	11·0	23, 24	...	...
Llandudno	*Carnarvon*	53 20	3 50	72	53·0	2, 12	20·0	25	5	...
Cargen [Dumfries]	*Kirkcudbright*	55 2	3 37	80	51·0	12	22·0	24§	11	...
Lilliesleaf (Riddell House)	*Roxburgh*	55 31	2 46	550	48·0	12	17·0	30	17	26
Edinburgh (Royal Observy.)	*Midlothian*	55 55	3 11	442	50·1	5	20·7	24	11	15
Colmonell (Clachanton)	*Ayr*	55 8	4 54	140	...	...	...	...	...	...
Glasgow (Queen's Park)	*Renfrew*	55 53	4 18	144	48·0	5, 7, 12	18·0	24	11	19
Tighnabruaich	*Argyll*	55 55	5 14	50	44·0	7, 17	20·0	23, 31	15	16
Mull (Quinish)	,,	56 36	6 13	35	47·0	7, 14, 28	...	...	...	...
Dundee (Eastern Necropolis)	*Forfar*	56 28	2 57	199	53·4	12	21·3	1	14	...
Braemar	*Aberdeen*	57 0	3 24	1114	...	...	...	...	...	...
Aberdeen (Cranford)	,,	57 8	2 7	120	52·0	15	20·0	25§	24	...
Cawdor (Budgate)	*Nairn*	57 31	3 57	250	...	...	...	...	...	...
Invergarry	*E. Inverness*	57 4	4 47	13c?	...	...	...	...	...	...
Loch Torridon (Bendamph)	*W. Ross*	57 32	5 32	20	...	...	...	...	...	...
Dunrobin Castle	*Sutherland*	57 59	3 56	14	53·0	8	22·5	26	14	...
Castletown	*Caithness*	58 35	3 23	100	51·0	16	23·0	25, 26	18	19
Killarney (District Asylum)	*Kerry*	52 4	9 31	178	56·0	6	17·5	24	...	...
Waterford (Brook Lodge)	*Waterford*	52 15	7 7	104	54·0	12, 28	19·0	25	8	...
Broadford (Hurdlestown)	*Clare*	52 48	8 38	167	52·0	1	22·0	23	14	...
Carlow (Browne's Hill)	*Carlow*	52 50	6 53	291	...	...	...	...	...	..
Dublin (Fitz William Square)	*Dublin*	53 21	6 14	54	53·5	28	27·5	25	4	16
Ballinasloe	*Galway*	53 20	8 15	160	...	..	...	...	...	...
Clifden (Kylemore House)	,,	53 32	9 52	105	...	..	...	...	...	...
Crossmolina (Enniscoe)	*Mayo*	54 4	9 18	74	...	...	...	...	...	...
Seaforde	*Down*	54 19	5 50	180	50·0	5	24·0	22	12	16
Londonderry (Creggan Res.)	*Londonderry*	54 59	7 19	320	...	...	...	...	...	...
Omagh (Edenfel)	*Tyrone*	54 36	7 18	280	51·0	5	20·0	23	1	14

† and 13, 14. ‡ and 25, 26. § and 26, 31

RAINFALL FOR JANUARY, 1907.

RAINFALL OF MONTH.							RAINFALL FROM JAN. 1.					
ver. '0-99.	1906.	Diff. from Av.	% of Av.	Max. in 24 hours.		No. of Days	Aver. 1870-99.	1906.	Diff. from Aver.	% of Av.	Mean Annual 1870-1899.	STATION.
in.	in.	in.		in.	Date.		in.	in.	in.		in.	
·89	·91	— ·98	48	·46	1	8	...	...	...	...	25·16	Camden Square
·36	1·00	—1·36	42	·48	1	10	...	...	...	...	28·36	Tenterden
·68	·85	—1·83	32	·56	1	9	...	...	...	...	29·93	West Dean
·39	·66	—1·73	28	·31	1	8	...	...	...	...	27·10	Hartley Wintney
·81	·97	— ·84	54	·42	1	11	...	...	...	...	24·66	Hitchin
·05	·96	—1·09	47	·54	1	8	...	...	...	...	26·75	Addington
·70	1·29	— ·41	76	·38	1	11	...	...	...	...	25·39	Westley
·67	1·72	+ ·05	103	·36	26	17	...	...	...	...	25·40	Brundall
·90	2·17	—1·73	56	·77	1	16	...	...	...	...	39·00	Winterbourne Stpltn
·19	1·73	—1·46	54	·76	1	13	...	...	...	...	35·00	Torquay
·87	2·73	—1·14	71	·72	2	19	...	...	...	...	38·85	Polapit Tamar
·52	1·23	—1·29	49	·47	1	12	...	...	...	...	30·75	Bath
·46	1·30	—1·16	53	·58	1	11	...	...	...	...	29·85	Stroud
·81	1·76	—1·05	63	·50	2	12	...	...	...	...	33·04	Woolstaston
·91	·83	—1·08	43	·23	2	10	...	...	...	..	24·50	Bromsgrove
·59	·78	— ·81	49	·25	1	5	...	...	...	...	23·30	Boston
1·74	·75	— ·99	43	·19	1	8	...	...	...	...	24·70	Hodsock Priory
1·95	1·15	— ·80	59	·37	2	12	...	...	...	...	26·18	Derby
3·38	2·30	—1·08	68	·49	1	20	...	...	...	...	42·43	Bolton
1·89	1·30	— ·59	69	·60	28	7	...	...	...	...	26·96	Ribston Hall
6·33	3·46	—2·87	55	·96	28	14	...	...	...	...	60·96	Arncliffe Vic.
1·80	1·01	— ·79	56	·31	30	12	...	...	...	...	27·02	Hull
1·96	·48	—1·48	24	·15	1	11	...	..	...	...	27·99	Newcastle
4·71	6·01	—8·70	41	1·00	28	20	...	...	...	...	132·68	Seathwaite
3·85	2·79	—1·06	72	·88	1	19	..	...	...	...	42·81	Cardiff
5·13	2·28	—2·85	44	·60	1	20	...	...	...	...	47·88	Haverfordwest
3·87	3·34	— ·53	86	·64	2	19	...	...	..	...	45·41	Gogerddan
2·57	1·42	—1·15	55	·36	1	15	...	...	...	...	30·98	Llandudno
2·54	2·02	—2·52	44	·49	29	9	...	...	...	...	43·43	Cargen
2·60	1·04	—1·56	40	·48	1	12	...	...	...	...	33·04	Riddell House
...	·84	...	...	·29	28	10	...	...	...	...	...	Edinburgh
4·52	2·50	—2·02	55	...	...	...	...	...	...	...	44·85	Colmonell
3·25	1·86	—1·39	57	·40	27	17	...	...	...	...	35·80	Glasgow
5·86	4·10	—1·76	70	·52	27	18	...	...	...	...	57·90	Tighnabruaich
5·85	4·59	—1·26	78	·58	4	26	...	...	...	...	57·53	Quinish
2·10	·95	—1·15	45	·45	1	12	...	...	...	...	28·95	Dundee
2·91	1·61	—1·30	55	...	...	...	...	...	...	...	36·07	Braemar
2·32	1·89	— ·43	81	·51	1	17	...	...	...	...	33·01	Aberdeen
2·14	1·70	— ·44	79	·27	28	16	...	...	...	...	29·37	Cawdor
6·63	6·36	— ·27	96	1·20	28	12	...	...	...	...	56·00	Invergarry
8·75	9·48	+ ·73	108	1·10	26	28	...	...	...	..	86·50	Bendamph
2·62	4·12	+1·50	157	1·06	2	17	...	...	...	...	31·60	Dunrobin Castle
...	3·89	...	...	·65	1	24	...	...	...	...	...	Castletown
6·57	2·38	—4·19	36	·63	1	15	...	...	...	...	58·11	Killarney
4·06	·79	—3·27	19	·19	1	17	...	...	...	...	39·30	Waterford
2·98	1·44	—1·54	48	·38	1	20	...	...	...	...	33·47	Hurdlestown
3·15	...	...	...	...	...	...	...	...	...	...	34·44	Carlow
2·16	·43	—1·73	20	·19	1	9	...	...	...	...	27·75	Dublin
3·49	...	...	...	...	...	...	...	...	...	...	37·04	Ballinasloe
7·86	3·83	—4·03	49	·60	3	19	...	...	...	...	80·23	Kylemore House
5·00	3·30	—1·70	66	·64	1	23	...	...	...	...	50·50	Enniscoe
3·63	1·39	—2·24	38	·55	1	12	...	...	...	...	38·61	Seaforde
3·56	3·47	— ·09	97	·72	1	20	...	...	...	...	41·20	Londonderry
3·34	2·25	—1·09	67	·40	1	20	...	...	...	...	37·85	Omagh

SUPPLEMENTARY RAINFALL, JANUARY, 1907.

Div.	STATION.	Rain. inches	Div.	STATION.	Rain. inches
II.	Abinger Hall	1·02	XI.	Rhayader, Tyrmynydd	...
,,	Ramsgate, West Cliff Villas	·87	,,	Lake Vyrnwy	3·47
,,	Hailsham	1·09	,,	Llangyhanfal, Plâs Draw	1·21
,,	Crowborough, Uckfield Lodge	1·58	,,	Criccieth, Talarvor	2·40
,,	Osborne, Newbarn Cottage.	·85	,,	Llanberis, Pen-y-pass	7·20
,,	Emsworth, Redlands	·92	,,	Lligwy	1·61
,,	Alton, Ashdell	1·27	,,	Douglas, Woodville	1·79
,,	Newbury, Welford Park	·71	XII.	Stoneykirk, Ardwell House	1·96
III.	Harrow Weald, Hill House.	1·00	,,	Dalry, The Old Garroch	4·41
,,	Oxford, Magdalen College	·54	,,	Langholm, Drove Road	2·46
,,	Bloxham Grove	·85	,,	Moniaive, Maxwelton House	2·26
,,	Pitsford, Sedgebrook	1·04	XIII.	N. Esk Reservoir [Penicuick]	2·45
,,	Huntingdon, Brampton	1·03	XIV.	Maybole, Knockdon Farm	1·95
,,	Wisbech, Bank House	1·09	XV.	Campbeltown, Witchburn	2·55
IV.	Southend Water Works	1·15	,,	Inveraray, Newtown	6·65
,,	Colchester, Lexden	·87	,,	Ballachulish House	7·52
,,	Newport, The Vicarage	·97	,,	Islay, Eallabus	3·62
,,	Rendlesham	1·13	XVI.	Dollar Academy	2·76
,,	Swaffham	1·10	,,	Loch Leven Sluice	2·44
,,	Blakeney	...	,,	Balquhidder, Stronvar	4·09
V.	Bishops Cannings	1·04	,,	Perth, Pitcullen House	1·19
,,	Ashburton, Druid House	2·16	,,	Coupar Angus Station	1·16
,,	Okehampton, Oaklands	2·69	,,	Blair Atholl	2·46
,,	Hartland Abbey	1·84	,,	Montrose, Sunnyside Asylum	1·09
,,	Lynmouth, Rock House	2·40	XVII.	Alford, Lynturk Manse	1·50
,,	Probus, Lamellyn	1·78	,,	Keith Station	2·05
,,	Wellington, The Avenue	1·36	XVIII.	N. Uist, Lochmaddy	4·12
,,	North Cadbury Rectory	·83	,,	Alvey Manse	2·65
VI.	Clifton, Pembroke Road	2·11	,,	Loch Ness, Drumnadrochit.	2·40
,,	Ross, The Graig	2·18	,,	Glencarron Lodge	13·11
,,	Shifnal, Hatton Grange	1·43	,,	Fearn, Lower Pitkerrie	1·64
,,	Cheadle, The Heath House.	1·14	XIX.	Invershin	4·22
,,	Blockley, Upton Wold	1·35	,,	Altnaharra	5·25
,,	Coventry, Kingswood	1·04	,,	Bettyhill	3·72
VII.	Market Overton	·87	,,	Watten Station	2·83
,,	Market Rasen	1·11	XX.	Dunmanway, The Rectory	2·70
,,	Bawtry, Hesley Hall	·61	,,	Cork	1·07
VIII.	Neston, Hinderton Lodge	·92	,,	Darrynane Abbey	2·92
,,	Southport, Hesketh Park	1·28	,,	Glenam [Clonmel]	·88
,,	Chatburn, Middlewood	2·35	,,	Ballingarry, Gurteen	1·38
,,	Cartmel, Flookburgh	2·41	,,	Miltown Malbay	2·25
IX.	Langsett Moor, Up. Midhope	2·25	XXI.	Gorey, Courtown House	·42
,,	Scarborough, Scalby	1·55	,,	Moynalty, Westland	1·39
,,	Ingleby Greenhow	·82	,,	Athlone, Twyford	1·59
,,	Mickleton	1·62	,,	Mullingar, Belvedere	1·07
X.	Bardon Mill, Beltingham	·83	XXII.	Woodlawn	2·45
,,	Ewesley, Fallowlees	1·09	,,	Westport, Murrisk Abbey	1·94
,,	Ilderton, Lilburn Cottage	·79	,,	Collooney, Markree Obsy.	3·07
,,	Keswick, York Bank	2·28	XXIII.	Enniskillen, Portora	2·08
XI.	Llanfrechfa Grange	2·97	,,	Warrenpoint, Summer Hill.	...
,,	Treherbert, Tyn-y-waun	5·22	,,	Banbridge, Milltown	1·02
,,	Carmarthen, The Friary	2·76	,,	Belfast, Springfield	2·54
,,	Castle Malgwyn [Llechryd].	2·34	,,	Bushmills, Dundarave	2·97
,,	Plynlimon	8·05	,,	Stewartstown, The Square	1·90
,,	Tall-y-llyn	2·00	,,	Killybegs	5·76
,,	New Radnor, Ednol	2·47	,,	Horn Head	2·83

METEOROLOGICAL NOTES ON JANUARY, 1907.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Temp. for Temperature; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; TS for Thunderstorm; R for Rain; H for Hail; S for Snow.

LONDON, CAMDEN SQUARE.—After a wet day on 1st, followed by a westerly gale on 2nd, the first half of the month proved mild and very dry but rather dull. Frost set in on 18th, and from 22nd to the end it was cold with little R and bitter winds at times. Mean temp. 38°·8, or 0°·7 above the average. Duration of sunshine 40·1* hours and of R 18·1 hours.

CROWBOROUGH.—The first 17 days were mild and entirely free from frost, but from 18th wintry weather set in with continuous frost. Min. temp. in screen 16°·4, on 24th. R 1·70 in. below the average of 35 years.

HARTLEY WINTNEY.—The driest January since 1892. The first fortnight was warm and spring-like with several sunny days, the latter more wintry with slight S, frost and keen N. and N.E. winds and cloudy days. Ozone occurred on every day, with a mean of 4·3.

TORQUAY.—Duration of sunshine 85·4* hours, or 21·5 above the average. Mean temp. 42°·6, or 0°·1 above the average.

NORTH CADBURY.—The driest January in 11 years and the coolest since 1897. The first two-thirds of the month were mild, but the last ten days cold, especially 23rd and 24th, which were both colder than any other day in 11 years.

SOUTHPORT.—Dry and exceptionally sunny. Very mild generally until 17th, but afterwards more wintry. Mean temp. 39°·4, or 0°·4 above the average. R 1·42 in. below the average. Duration of sunshine 53·7* hours, or 10·3 hours above the average. Duration of R 26·9 hours.

BOLTON.—The first part was comparatively mild, but on 23rd the temp. fell 9°·0 and the weather was afterwards severe. The 25th was the coldest day since 1894. Duration of sunshine 25·0* hours, or 3·5 hours above the average.

HAVERFORDWEST.—Cold at times and very changeable. Hard frost from 22nd to 25th. Duration of sunshine 73·6* hours.

DOUGLAS.—The month opened with cold R and strong W. gales, and H on 4th, followed by a mild fortnight with many sunny days. Real winter set in on 20th with hard frost to the end. On 23rd the bar. reached 30·98 in.

COUPAR ANGUS.—Mean temp. 1°·0 below and R about 50 per cent. below the average. A noteworthy feature of the month was the high pressure and great range and fluctuation of the bar.

BLAIR ATHOLL.—Seasonable till 5th, then remarkably mild till 17th, after which frost was continuous to the end, with S during the last week.

DRUMNADROCHIT.—R 1·44, and rain days 3, below the average of 21 years. Gale on 28th accompanied by distant T.

CASTLETOWN.—The first part was rather wet and on the whole mild. From 15th to 23rd was remarkably fine and dry; on 23rd the bar. reached 31·15 in. On 28th there was a heavy westerly gale with S storm and the bar. fell to 28·87 in. soon rising again. The last few days were stormy, with S and H.

DUNMANWAY.—On the whole cold and dry, especially from 21st to 30th, with skating on 25th and 26th; this occurs only about once in five years here.

CORK.—R 3·13 in. below, or only about one-fourth of, the average. Mean temp. 2°·1 below the average.

CLONMEL.—The driest January recorded since 1865.

MILTOWN MALBAY.—The first week was cold, blustry and "dropping", then to 21st mild, after which sharp frost intervened for three or four days. Stormy weather with squalls, H, S and R from 29th.

DUBLIN.—Remarkable for the high mean bar., 30·303 in., the scanty R falling only during 20 hours, the warm anticyclonic winds from 5th to 18th, and the biting easterly anticyclonic winds from 19th to 25th. The mean temp. was 42°·7, or 1°·1 above the average.

OMAGH.—The temp. of the month was above the average, but the R below. The month varied little from the normal in other respects.

* Campbell-Stokes.

Climatological Table for the British Empire, August, 1906.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp.	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Average. Dew Point.	Average. Humidity.	Absolute. Max. in Sun.	Absolute. Min. on Grass.	Total Rain. Depth.	Total Rain. Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
London, Camden Square	93·2	31	45·7	29	77·1	55·3	56·8	74	130·5	42·4	·87	8	...
Malta	98·0	6	67·3	25	88·3	72·6	68·3	69	...	62·4	1·76	3	0·7
Lagos	85·0	5*a*	71·0	18	82·6	73·8	71·7	80	137·0	68·0	1·68	13	7·9
Cape Town	76·0	3	33·1	8	59·8	44·3	44·4	74	...	...	2·86	14	5·5
Durban, Natal	95·9	14	47·0	3, 4	75·6	54·1	...	...	138·4	...	·27	5	3·0
Johannesburg	78·0	24	27·9	2	64·2	40·8	35·6	59	138·0	23·2	·00	0	0·4
Mauritius	77·4	14	51·6	15	74·9	61·0	58·9	74	139·7	43·9	1·84	17	5·7
Calcutta	91·7	31	75·9	15	88·4	78·7	77·7	85	157·0	74·5	8·14	18	8·2
Bombay	87·8	16	75·4	20	84·6	77·9	76·0	85	131·7	71·0	20·91	25	8·4
Madras	97·9	30*b*	73·5	20	92·0	77·3	75·2	80	144·3	72·7	4·45	12	5·2
Kodaikanal	67·1	16	50·3	14	62·5	52·5	53·3	89	140·4	42·5	12·44	27	7·9
Colombo, Ceylon	87·2	30	71·8	15	85·2	77·2	74·0	83	149·2	70·2	5·86	14	7·2
Hongkong	93·7	28	74·6	30	88·8	79·1	75·8	79	143·9	...	3·97	10	5·3
Melbourne	67·6	9	31·1	30	57·0	43·0	42·8	78	122·4	24·8	1·73	13	7·5
Adelaide	67·0	23	36·1	28	60·2	45·8	45·0	76	124·5	32·1	3·97	16	7·0
Coolgardie	70·6	21	36·4	1, 25	59·5	43·7	40·0	71	139·0	30·1	3·27	8	5·6
Sydney	73·0	25	40·7	28	61·5	47·7	43·8	75	104·1	31·8	5·64	18	5·0
Wellington	65·5	20	33·5	3, 8	53·3	43·2	42·0	76	115·0	23·0	2·80	10	5·0
Auckland	62·0	30	38·0	8	56·9	47·3	44·6	76	120·0	33·0	1·76	11	5·6
Jamaica, Negril Point	91·0	20	66·1	18	87·3	72·7	73·0	77	...	...	4·87	11	...
Trinidad	90·0	13*c*	69·0	scv.	86·1	70·9	74·2	86	166·0	67·0	8·55	24	...
Grenada	88·4	29	70·2	6, 7	84·6	74·3	72·4	80	145·0	...	11·87	25	4·1
Toronto	89·0	5	52·0	29	81·1	62·6	62·3	75	113·5	45·4	1·83	11	4·5
Fredericton	92·8	17	31·8	31	77·1	53·1	...	...	...	...	1·33	6	4·5
St. John's, N.B.	81·6	7	50·5	25	70·7	56·1	...	...	...	...	1·29	12	5·0
Victoria, B.C.	80·5	26	45·4	16	72·9	51·7	...	74	...	...	·53	4	2·6
Dawson	78·0	4	30·0	23	67·9	40·2	...	...	...	...	1·46	11	5·3

a and 6, 21. *b* and 31. *c* and 14.

MALTA.—Mean temp. of air 79°·3, or 1°·2 above the average. Mean hourly velocity of wind 8·5 miles, or 1·2 above average. Mean temp. of sea 79°·8.

Mauritius.—Mean temp. of air 0°·4, dew point 0°·5, and R ·40 in. below, averages. Mean hourly velocity of wind 9·9 miles, or 2·4 below average.

KODAIKANAL.—Abnormally wet and cloudy month. Bright sunshine 90 hours.

COLOMBO.—Mean temp. of air 80°·8 (average), of dew point 0°·8 above, and R 2·21 in. above, averages. Mean hourly velocity of wind 8·5 miles.

HONGKONG.—Mean temp. of air 83°·2. Bright sunshine 281·2 hours, or 85·2 hours above average. R 10·25 in. below average. Mean hourly velocity of wind 6·7 miles.

Adelaide.—Mean temp. of air 53°·0, or 0°·8 below, and R 1·63 in. above, averages. Most cloudy August on record. Sunshine ·41 hours less than average.

Sydney.—Mean temp. of air 0°·2 below, and R 2·42 in. above, averages.

Wellington.—Mean temp. of air 0°·3 below, and R 2·20 in. below, averages. Bright sunshine 137 hours.

TRINIDAD.—R 1·48 in. below 43 years average.

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RAIN GAUGE EXPOSURE IN THE TRANSVAAL.

By R. T. A. Innes,
Director of the Transvaal Meteorological Department.

One of the standard 5-inch rain gauges at the Johannesburg Observatory is situated on the summit of the Witwatersrand ridge and another in the valley to the north, but only 200 yards or so distant.* The summit gauge always receives less rain than the valley gauge, and it was determined to find out what the effect of a wind-shield on a gauge on the summit would be. Dr. Shaw sent out a wind-shield 18 inches in diameter, and this was put on another gauge erected on the summit. These two gauges have always received the same amount of rainfall, as the accompanying Table which follows show. The photographs on the next page show the rain gauges on the summit. The rain gauge in the foreground is an $11\frac{1}{4}$-inch Halliwell recorder. The first photograph (Fig. 1) shows the ordinary method of mounting rain gauges formerly in use in this Colony; the rain gauge on the right hand shows the wind-shield. In the second photograph (Fig. 2), the rain gauge with the wind-shield is replaced by one mounted in the new style, which is now used. The earlier iron tripod is replaced by a galvanized iron tube, which is filled with soil and the gauge packed in it. The tube stand is firmer and the gauge itself is not so liable to damage by cattle. As in the other colonies of South Africa, all the gauges have their rims 4 feet above ground.

I add a second table giving a comparison of records obtained with a 5-inch standard gauge on a tripod and an 8-inch gauge on a wooden stand at Heidelberg in this Colony. The gauges are only a few feet apart and have an identical exposure. Slight changes in their relative positions have been made on two occasions. The advantage of the more cumbersome and expensive 8-inch gauge is not apparent. The relative capital cost of an 8-inch gauge erected in this Colony is five times that of a 5-inch gauge, so that this question has its importance where funds are limited.

* See this Magazine, Vol. 40 (1905), p. 203.

RAIN GAUGE EXPOSURE IN THE TRANSVAAL.

FIG. 1.

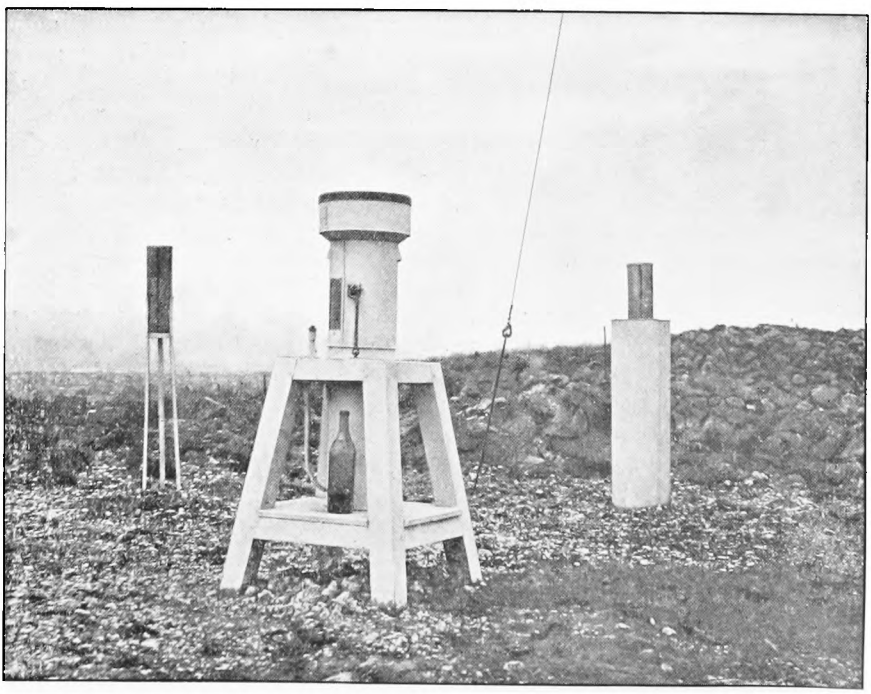


FIG. 2.

Rain Gauges at Observatory, Johannesburg * (*all 5 in. gauges*).

	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Jun.	TOTAL.
1905-6.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
Summit.....	...	·06	·23	·85	6·04	3·99	3·81	8·54	3·39	·88	·11	...	27·90
Summit (with wind shield).....	...				5·88	3·98	3·80	8·56	3·39	·88	·12	...	—
Valley	...	·08	·29	·92	6·76	4·52	4·04	9·00	3·71	·95	·13	...	30·40
1906-7.													
Summit.....	...	...	·51	4·97	5·34	4·59							—
Summit (with wind shield).....	...	...	·55	4·97	5·08	4·52							—
Valley	...	...	·55	5·31	5·69	4·88							—

*Rain Gauges at Heidelberg, Transvaal.**

	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Jun.	TOTAL.
1904-5.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
8 in. gauge..	...	·06	·20	1·56	6·45	3·27	5·79	5·97	3·01	2·26	·28	...	28·85
5 in. gauge..	...	·06	·20	1·54	6·50	3·30	5·83	5·91	2·97	2·27	·29	...	28·87
1905-6.													
8 in. gauge..	...	·28	·58	·27	6·70	4·99	1·37	5·93	3·40	·71	·19	...	24·42
5 in. gauge..	...	·29	·55	·27	6·95	4·98	1·34	5·93	3·38	·71	·17	...	24·57

* The meteorological year in the Transvaal is reckoned from July to June.

THE BRITISH WEATHER REPORTS.

WITH the beginning of the present year various changes appeared in the Weather Reports issued by the Meteorological Office, which cannot fail to increase their utility to the student as well as to the practical man who has learned how to apply the facts collected and published at the public expense to his own advantage.

We propose here to describe briefly the Daily, Weekly, and Monthly Weather Reports, in their present form, hoping that the public interested in Meteorology may thus be helped to realize more fully than we fear they now do, the completeness and promptitude with which this national work is carried on.

The *Daily Weather Report* is a four-page quarto sheet, issued daily at 2 p.m., after which hour it may be purchased for one penny at the Meteorological Office, 63, Victoria Street, or at the bookstalls in the railway stations at Victoria, Charing Cross, King's Cross, St. Pancras and Euston. We do not remember that we have ever had the *Daily Weather Report* thrust upon our attention at any of the railway stations in question; but at least it may be had there for the asking, which is more, we doubt, than can be said for this Magazine. The *Daily Weather Report* is sent post free to any address for

£1 per annum, and is usually delivered in London between 4 and 5 p.m.

The front page of the Report is occupied with observations of barometer, thermometer, wind, and weather, on the previous evening and on the morning of the day of publication, together with the maximum and minimum temperatures, weather, sunshine, and rainfall at 27 stations in the British Isles, at 31 stations on the continent of Europe, and at 6 in the islands of the North Atlantic, 64 stations altogether.

The last page of the Report contains explanatory notes for the first page, and a quantity of additional information, including figures for the previous day at 24 places in England and Wales, chiefly health resorts, and at 19 foreign stations, going as far afield as St. Petersburg, Malta, Algiers and Madeira. There is also a space neatly ruled off for "Wireless telegrams from ships of H.M. Navy," and this will no doubt be filled in the future, though so far no wireless messages have appeared.

The two inner pages of the Report are devoted to maps, notes, and forecasts. The first map has been extended beyond the limits imposed in previous years, so that now it includes the whole of Western Europe and a strip of the North Atlantic, which allows Iceland on the north, and the Azores on the south, to appear in their proper positions. Observations from the Azores have appeared in the Report for some time, but the inclusion of the data from Iceland and the Färoes is a triumph of the current year, and a most valuable result of the new Iceland cable. The Azores are separated from Europe by too great an extent of sea to allow the data to be used in drawing the isobars which depict the daily distribution of pressure, but Iceland is brought so near to Britain by the convenient stepping stones of Färoe and Shetland, that we now find on the daily weather chart a close approximation to the state of things in the great cyclone track that runs from south-west to north-east, just north of Scotland, and controls our weather to a great extent. It is too soon yet to say how far the new data will increase the accuracy of the forecasts; but they certainly improve the basis on which the forecasts are made. One of the most impressive results is the emphasis with which the new chart expresses the range of pressure that may be experienced. For example, the chart of Wednesday, 20th February, shows a depression over the south of Norway, with a minimum reading of 27·65 in., and a high-pressure area over Portugal with 30·44 in., the total range of pressure in 1400 miles being 2·79 in., or within a quarter of an inch of three inches. The steep gradients and the slow movement of this storm centre shown by the comparison of the charts for several successive days, explain the furious force and the extraordinarily long continuance of the gale which wrecked the Great Eastern Railway steamer *Berlin*, off the Hook of Holland, on the morning of the 21st, and postponed the rescue of the last surviving passengers for 36 hours.

A second large map shows the 8 a.m. distribution of temperature and weather, and small maps show the conditions at 8 a.m. and 6 p.m. on the previous day. The forecast districts are shown on a small map and the storm signals which were flying at the time of publication are indicated on this map. It is a significant tribute to the advance of geographical education that so much important information is presented by a government institution in a cartographic form without the use of words.

The *Weekly Weather Report* is a quarto document of 8 pages, price 6d., or post-free for a year £1 10s., and is issued on the Thursday of the week following that to which it refers. This Report is now in its thirtieth year, but the current volume inaugurates a series of improvements which greatly add to its value. The first page consists of general remarks on the week, with notes on the season and on the past four seasons, the elements referred to being weather, temperature, mean temperature of the sea, rainfall, bright sunshine, barometer and wind. Warmth for each of the twelve forecasting districts is characterised in a tabular summary as Very Unusual, Unusual, Moderate, Deficient, Very Deficient; rainfall similarly as Light, Moderate, Heavy; sunshine as Scanty, Moderate, Abundant. The summary of the thirteen weeks of winter in each of the 12 divisions is given in the form "Rainfall 4*2" where the heavy figure is the number of weeks of heavy rain, the light figure the number of weeks of light rain, the missing weeks representing the number with moderate rain. The definition of the characteristic terms must represent a great deal of thought and calculation. The week's warmth is called "unusual" or "deficient" if it is so much above or below the average for the time of year that in the long run it is likely to occur for that week only once in three years, and "very" is prefixed if it is likely to occur for that week only once in twelve years. Otherwise it is called moderate. Exactly similar definitions are assigned to the terms used for rainfall and sunshine, the whole system being based on the principle of the relative frequency of the values which occur. The idea seems to us a happy one, as it facilitates the comparison of different periods or seasons over considerable areas.

The second page gives for the week, the season and the year, so far as the latter have advanced, the temperature, accumulated number of day-degrees, rainfall and sunshine of each of the twelve divisions; the figures for each of the stations used to obtain the means (90 in all) being given on the third page. Some of the records are contributed by the Royal Meteorological Society and others by the Scottish Meteorological Society, these being duly distinguished from the records of the official stations.

The fourth page contains two Tables, one of grass minimum temperatures and of soil temperatures at depths of 1 foot and 4 feet; the other the highest, lowest and mean temperature of the sea taken twice daily by the coastguards at 21 stations round the British Isles.

Local circumstances make this Table of somewhat unequal value, but it at least calls attention to the importance of considering the sea as well as the land surface in the study of atmospheric conditions.

The remainder of the Report is occupied by three maps for each of the seven days of the week, giving respectively the temperature and weather at 8 a m., the barometer and wind for 8 a.m. and 6 p.m. They are, in fact, a revised and reduced copy of the maps published in the *Daily Weather Report*. Brief explanatory remarks on the weather, temperature, wind and barometer for each day are added.

Finally, there is a summary of the week's observations on temperature, humidity and wind-velocity in the upper air, as ascertained by the ascent of kites or balloons at various stations, especially Brighton, Pyrton Hill on the northern slopes of the Chilterns, Ditcham Park on the South Downs and sometimes the Manchester University station in Derbyshire.

For many years it was the custom to issue a Monthly Supplement to the *Weekly Weather Report*, but with the first month of 1907 this has assumed the more elaborate form of a *Monthly Weather Report*, consisting of 8 quarto pages, to be published before the end of the next following month, and sold at 6d. per copy or 6s. 6d. per annum post free.

The first page gives a summary of the result of observations for the month, with special reference to pressure, the tracks of depressions, the occurrence of anticyclones, wind, temperature, rainfall, sunshine and observations in the upper air. The next five pages are devoted to a very complete summary of the observations at 123 stations in the British Isles and less complete statistics for 47 more. The seventh page contains notes on the statistical Tables and special information regarding special phenomena; thus in the Report for January there is a discussion of the remarkable high-pressure system which prevailed over northern Europe from the 20th to the 26th.

The last page is occupied by four maps expressing in considerable detail the average or general conditions of the month. The first deals with pressure and wind, showing the average for the particular month and the average for that month for 35 years. The second map shows the movements of the barometric depressions for the month, the tracks of each cyclone joining the positions of the centre at 8 a.m. and 6 p.m. on the days of its existence. The third map shows the mean temperature of the month by isotherms drawn for each degree. The fourth map represents the distribution of rainfall for the month and is a new departure in so far as it is prepared by the British Rainfall Organization from about 700 monthly returns. The large number of observations makes it possible to draw lines showing the areas with less than an inch, between 1 and 2 inches, between 2 and 3, between 3 and 4, between 4 and 6, between 6 and 8, between 8 and 10 and over 10 inches; and as each succeed-

ing line is made thicker than the line of lower value the gradation of rainfall is clearly shown. It is, we are sure, a pleasure to all the unofficial observers of rainfall to know that their work is accepted by the Meteorological Office as of public utility, and the full title of the Monthly Weather Report recognizes the voluntary assistance in its wording—"Monthly Weather Report of the Meteorological Office. Summary of Observations compiled from the returns of official stations and volunteer Observers in the United Kingdom, with a Chart contributed by the British Rainfall Organization. Issued by the Authority of the Meteorological Committee." Such co-operation between the various meteorological agencies in the country cannot fail to have a stimulating effect on the advancement and the wider understanding of meteorology.

QUALITATIVE ANALYSIS OF CURVE DIAGRAMS.

By WILHELM KREBS, Hamburg.

THE following statements show a simple method for getting numerical values from the comparison of curve diagrams, which I have also applied to other statistical investigations. It deals only with the general direction of the oscillations, *i.e.*, whether the curve is rising or falling, and can therefore be said to be a qualitative analysis of such diagrams. It would, if applied to the "barometric see-saw," enable one to get numerical values for drawing "isophasms" of pressure and for supplying the place of such doubtful signs as +?, —?, ± and ∓?.

I choose another actual example as an illustration.

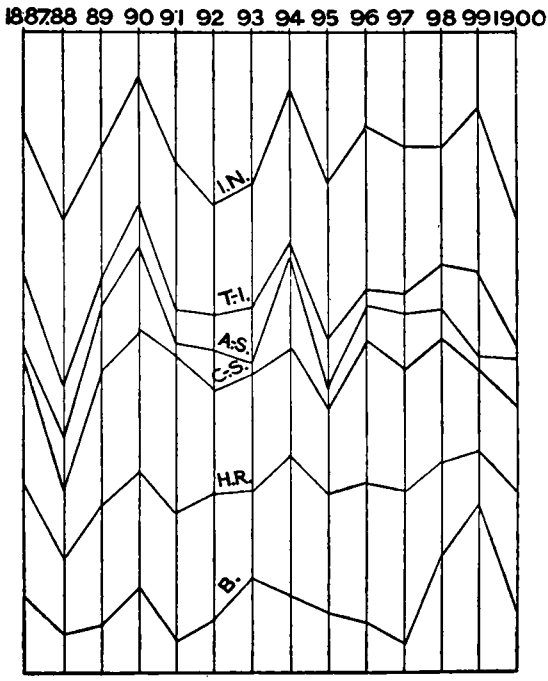
In the following, diagrams are compared from 1887 to 1900.

I.—The mean oscillation of the sea-level of the Baltic on the Swedish shores (B.), after Rosén;

II.—Five other oscillations regarding the quantities of heat in the North Sea near Horns Reef (H.R.), the differences of air-pressure between Copenhagen and Stykkisholm, Iceland (C.S.), between the Azores and Stykkisholm (A.S.), between Toronto and Ivigtut, Greenland (T.I.), and the quantities of Arctic ice near Newfoundland (I.N.), after Meinardus.

The *qualitative analysis* is given in extenso here :—

	1887—'88	— '89	— '90	— '91	— '92	— '93	— '94	— '95	— '96	— '97	— '98	— '99	—1900
B.	down	up	up	down	up	up	down	down	down	down	up	up	down
H.R.	d.	u.	u.	d.	u.	u.	u.	d.	u.	d.	u.	u.	d.
C.S.	d.	u.	u.	d.	d.	u.	u.	d.	u.	d.	u.	d.	d.
A.S.	d.	u.	u.	d.	d.	d.	u.	d.	u.	d.	u.	d.	d.
T.I.	d.	u.	u.	d.	d.	u.	u.	d.	u.	d.	u.	d.	d.
I.N.	d.	u.	u.	d.	d.	u.	u.	d.	u.	d.	0	u.	d.



Agreements with H.R.

	Number			%
B.	11	: 13	=	85
C.S. ...	11	: 13	=	85
A.S. ...	10	: 13	=	77
T.I. ...	11	: 13	=	85
I.N. ...	11.5	: 13	=	89

1. The oscillations of water-temperature near Horns Reef (H.R.) show an important accordance (85%) with those of the Baltic sea-level (B.)

2. They show the same accordance (85%) with the differences of pressure for Toronto-Ivigtut (T.I.) and Copenhagen-Stykkisholm (C.S.)

3. They show a less agreement (77%) with the differences of pressure Azores-Stykkisholm (A.S.)

4. They show a very important agreement (89%) with the oscillations of Arctic ice near Newfoundland (I.N.)

The following conclusions seem to be justified :—

The water-temperature near Horns Reef, the sea-level of the Baltic, and the quantities of Arctic ice near Newfoundland, depend in a high degree on the same causes (1, 4).

The mean atmospheric circulation over the northern Atlantic, especially in the winter half of the year, forms an important part of these causes (2).

It seems possible that the temperature of the eastern part of the North Sea is changed indirectly by the circulation causing the colder surface-water of the Baltic (mean difference from the surface temperature of the North Sea, 4·5° F.) to be more or less effective in cooling the surface of the North Sea.

RAIN-MAKING EXPERIMENTS IN THE KLONDIKE.

WE have pleasure in reprinting from *The Times* of February 11th the following statement as to the "rain-making" experiments referred to in Vol. **41**, p. 115 :—

Owing to the scarcity of water for hydraulic mining in the Klondike district, the Government of Yukon Territory and a number of the largest mineowners and operators made, as reported some time ago in *The Times*, a contract with Mr. C. M. Hatfield, of Los Angeles, who had made many "rain-making" experiments in the arid parts of California. If he produced "a sufficient rainfall to ensure, as far as an ample rainfall would, a successful and prosperous summer in the placer mining industry," the fact to be determined by a board representing the various parties to the contract, he was to receive $5,000 from the Government and $5,000 from the miners; otherwise he was to receive the travelling and living expenses of himself and his assistant. The Commissioner administering the territory now reports that Mr. Hatfield "commenced his demonstrations on June 11th, on a high eminence called the 'Dome,' about 80 miles from Dawson. On Hunker, Sulphur, Gold Run and Dominion creeks the rainfall for June was above the average, but on Bonanza and Eldorado it was below normal. During the early part of July there was no increase over the average of former years. Accordingly, at a meeting of the aforesaid board, held at Dawson on July 23rd, it was decided that 'in the opinion of this committee the contract entered into on July [*sic.*] 10th, 1905, has not been carried out, and that Mr. Hatfield be notified that his contract is terminated.' A copy of this decision was immediately sent to Mr. Hatfield, who thereupon desisted from further experiments. The Government of the Yukon Territory paid $1,153.05 to Mr. Hatfield in full settlement of its liability under said contract." The Commissioner also reports that agriculture is developing in the territory, and regulations have been made under which homestead land can be acquired on liberal conditions by *bonâ fide* settlers. Last summer enough gronnd was brought under cultivation in the Dawson district practically to supply the local demand for vegetables, and the Commissioner expects a large increase in the cultivated area this year.

WEATHER RECORDING.

BY F. DRUCE.

FROM time to time there have appeared in the pages of this Magazine notes on the states of the sky and atmosphere as precursors of weather change.

There is, probably, no student of meteorology but has felt the great difficulty there is in describing adequately in his register the daily phenomena so far as they are not recorded instrumentally.

Some, *e.g.*, wind velocity and cloudiness, are referred to scales and notations—and this is so far satisfactory,—but there are many aspects of sky and atmosphere which cannot be thus dealt with, and are very difficult of description. In proof of this get a number of persons to write down their impressions of the weather of a particular day, and it is a safe assumption that their accounts will vary materially, not necessarily through inaccuracy of observation or the personal equation, but through the inadequacy of means of expression. The whole question is of little importance, no doubt, to a forecaster in a central office receiving telegrams from widely scattered districts,—it rather appeals to the "solitary observer" who is concerned to keep as accurate a register as possible, and one that will be of use, on reference, for forecasting purposes, both to himself and others.

To take a few instances :—(i.) The sky on a hot morning in late spring or summer is clear, except for a few small patches of cirro-cumulus cloud, the atmosphere is very hazy, and the wind is very light, from E.S.E. ; (ii.) The sky (again in summer) is quite covered with cirro-stratus cloud, which gradually assumes the appearance of fine net or gauze, while the atmosphere becomes thicker and thicker, not with fog or mist, but (if the expression may be used) with *damp*, the wind is E.N.E. ; (iii.) The sky is, again, overcast (with cloud much lower in level than in No. 2) and has the appearance of being underlaid with smoke, the wind is W.N.W. ; (iv.) The atmosphere is exceedingly clear in late spring, and the sky partly covered with small cumulus clouds, with hard edges, the wind is N.W. These instances, respectively, may be taken as fairly safe indications of (i.) a late afternoon thunderstorm with wind veering to S.W. ; (ii.) a steady persistent fall of rain, perhaps of an inch or more ; (iii.) intermittent drizzle or rain of little intensity, and (iv.) a backing of wind to S.W. and a gale and rain ; but although the observer has in this way done his best to record the prognostics, (and following weather) and he himself might be able to recognize the former, when recurring, with the recorded descriptions, it is doubtful whether another person taking up the register would gather at all clearly what was meant.

The matter is difficult, and it is not easy to point out any very practicable means of improvement. The connection of meteorology with the affairs of everyday life is, however, so obvious, that no apology should be needed for suggesting that, so far as the observer himself is concerned, a careful diary of his doings side by side with the weather record is of considerable use. The letter of Mr. Bonacina (Vol. **41**, p. 192) provides an instance of this. In it he describes the state of the sky and the following weather near Sevenoaks, on November 3rd last. The present writer, who was on the other side of London on that day, on reading the letter, referred to his diary, and the events there recorded brought clearly to his recollection the state of the sky, the description of which in his

weather register, as a matter of fact, corresponded closely with that given by Mr. Bonacina.

A valuable aid to making an observer's record intelligible to others is to be found in photography—though it must be admitted that with the exception possibly of No. 4, the camera would have been useless in the instances given above. The importance of photography in this connection has already been pointed out in these pages (*e.g.*, Vol. **38**, p. 80), and satisfactory pictures of many cloud forms can be made and annexed to the record, but, of course, the "general look" of the weather and "state of the atmosphere" cannot be recorded in this way. It seems that the best hope of improvement lies in increased care and intelligence, both in observing and in recording what is observed.

ROYAL METEOROLOGICAL SOCIETY.

THE monthly meeting of this Society was held on Wednesday evening, February 20th, at the Institution of Civil Engineers, Great George Street, Westminster, Dr. H. R. Mill, President, in the chair.

Mr. Edward Mawley read his "Report on the Phenological Observations" made during 1906 by observers in various parts of the British Isles. The most noteworthy features of the weather of the phenological year ending November, 1906, as affecting vegetation, were the dry period lasting from the beginning of June until the end of September, and the great heat and dryness of the air during the last few days in August and the first few days in September. Wild plants came into flower in advance of their usual dates until about the middle of April, after which time they were late as a rule to about the same extent. Such early spring migrants as the swallow, cuckoo, and nightingale, reached these Islands somewhat behind their average dates. The only deficient farm crop, taking the country as a whole, was that of hay, all the others being more or less over average. The yield of apples was about average in all but the north of England and in Scotland, where there was a very scanty crop. Pears and plums were everywhere very deficient, whereas all the small fruits yielded moderately well. As regards the farm crops, the past year proved even more bountiful than 1905.

Mr. H. Mellish, Mr. J. E. Clark, Mr. F. C. Bayard, Mr. J. Hopkinson, Mr. W. W. Bryant and the President took part in the discussion, and Mr. Mawley replied.

Mr. R. Inwards read a paper on "The Metric System in Meteorology." He stated that it was not his intention to discuss the general question of the advantages of the metric system over that in use by Britain and her Colonies and the United States of America, but to confine his remarks to the manifest advisability of all the meteorological observers upon the globe adopting some uniform system.

He then proceeded to show by a map how many countries have adopted the metric system in meteorology, and how many use the non-metric. He concluded by saying: "With confident expectation we may, I think, look forward to the time when the whole world will have but one system of meteorological calculation, and as the matter of reconstruction or alteration of some of the standards, units or zeros is now 'in the air,' it would give a good opportunity, if changes must be made, to adopt in England and America the same system which has been for so long a time in use on the Continent of Europe and over a great portion of the land surface of our planet."

In the discussion on this paper, Mr. H. Mellish, Mr. W. H. Dines, Mr. R. H. Curtis, Mr. W. W. Bryant, Mr. F. C. Bayard, Mr. W. Marriott and the President took part, and the general feeling appeared to be unfavourable to the adoption of the metric system by British meteorologists.

Mr. J. L. Adlercron, Mr. G. T. Derry, Mr. W. H. M. Jones, Capt. G. M. Keane, R.N., Mr. J. McEwan, Mr. A. Mudd, Mr. R. Nursey and Mr. A. B. Ogden were elected Fellows of the Society.

A RELATION BETWEEN RAINFALL AT YORK AND SOLAR CYCLES.*

By J. Edmund Clark, B.Sc.

Working with the 89 years of extant records at York (1811 to 1824 and 1831 to 1905), a very obvious contrast was noted between the August rainfall and that of the next two months. August was relatively wetter at times at and following solar quiescence, drier at and following solar activity.

The values for the annual rainfall and for each month were therefore compared with Wolf and Wolfer's sunspot values. Three years were taken about each of the six maxima and minima from 1831 to 1902, or 18 in all at each. The annual values showed 425·73 in. for the latter and 475·73 in., or 12 per cent. more, for the former. *Every* minimum, except that of 1879, produced less rain than the succeeding maximum. Nine of the months contributed to this; in August alone was there marked excess.

For the 18 years at minima the August rainfall was 59·78 in.; at maxima, 38·02 in., or an excess of 36½ per cent. The values for September were 45·19 in. and 30·53 in.; for October, 49·61 in. and 35·62 in.

Again, for August and October the contrast is true of *each* decade, comparing the fall at each solar minimum with the following maximum. It is true, also, of the first four in September by nearly two to one. In the sixth the values are equal. That they are reversed

* Abstract of Paper read at the Meeting of the British Association at York, 1906.

in the fifth is not surprising, as September in the seventies gave a mean of 3·36 in., against 1·89 in. for the other 79 years.

We can accentuate the above contrast by taking the difference between the mean of September and October $(\frac{S+O}{2})$ and August (A); that is, by using the value $\frac{S+O}{2} - A$. The actual mean result is − 0·26 in.

The resulting curve from taking the 3-bloxamed values year by year is strikingly analogous to the sunspot curve.

These year-by-year values were sorted out over a smooth 11-year cycle,* the first year (I.) corresponding to minimum and the sixth (VI.) to maximum sunspots.

This smoothing can be likened to the stretching round an 11-inch cup-rim of six rubber rings, ranging from 9 to 13 inches round, all marked in inches. "I." of each ring comes on "I." of the cup. On "VI." comes the actual year of sunspot maximum, ranging from "IV." to "VII." The rest are stretched or puckered over the values between.

The six sets were then combined and the mean taken for our formula $\frac{S+O}{2} - A$.

The resulting values give an unbroken curve practically identical with the sunspot curve. If the half-periods are taken, each is practically the same. So also if the unbloxamed values are used. This is shown in the subjoined Table.

	I.	II.	III.	IV.	V.	VI.	VII.	VIII	IX.	X.	XI.
1831-1866—3-bloxamed ...	−1·3	−2·0	−1·3	−0·9	+0·1	+0·1	+0·1	+0·2	−0·1	−0·5	−1·2
1867-1905— ,, ...	−1·3	−0·6	−0·2	+0·3	+0·4	+1·0	+1·1	+0·6	+0·7	−0·0	−0·6
1831-1905— ,, ..	−1·3	−1·2	−0·7	−0·2	+0·3	+0·5	+0·6	+0·4	+0·3	−0·3	−0·9
,, un-bloxamed	−1·8	−1·0	−0·7	−0·3	+0·2	+0·6	+0·6	+0·6	+0·3	+0·0	−1·0
1831-1901—Sunspots	6	17	37	62	78	115	86	69	41	25	14

Similar results are found for other British stations examined, including the long-period records from Exeter (87 years), Rothesay (103) and London (106). If the same 70 years are taken, the resemblance is still closer. The minimum at I. occurs even for the longer records. Uppingham also (1736–98) is similar, though the extremes fall at II. and VIII., accentuating the tendency to "lag."

For York rain days $\frac{S+O}{2} - A$. ranges from − 0·8 at I. to + 2·2 days at V. and 1·9 as a "hump" at X. The temperature range is from − 6·9° at II. to − 9·0° at V., but the curve is more irregular.

The two 35-year periods also yield similar interesting results. This is more marked when the 11-year cycles are eliminated from the rainfall and sunspot curves.

* See *Symons's Meteorological Magazine*, February, 1904.

Correspondence.

To the Editor of Symons's Meteorological Magazine.

AURORA BOREALIS ON FEBRUARY 9th.

LAST night, after dark, noticing that the northern sky was very much lighter than it ought to have been, I suspected that an aurora was the cause. The early part of the phenomenon was much obscured by fog, but soon after 8 p.m. the fog dispersed, revealing a rather fine display of aurora borealis for the south of England. The arc was broad and extensive, and of varied hues of rose red and gold; the streamers were sharply defined, and extended nearly half way across the firmament, whilst the coruscations were at times quite brilliant. L. C. W. BONACINA.

Clandon, Surrey, February 10th, 1907.

The following notes of the auroral display of February 9th may be of interest.

8.15 p.m.—The aurora appeared.

8.20.—Faint streamers of light, extending up from N. by W. horizon. A large patch of a vivid scarlet colour appeared over the western horizon at an elevation of 35°.

8.35 to 8.45.—The streamers of light replaced by waves or pulsations of light passing across the sky from N. by W.

8.50.—Re-appearance of streamers of light, one of great brilliancy extending from N. and W. horizon, through Cassiopea well towards the zenith Cessation of pulsations of light.

8.55.—Streamers disappear, faint pulsations of light again noticeable, as waves crossing the sky.

The display was followed by the appearance of a bank of black cloud (fog), 10° in elevation, lying off the N. horizon, at times cirrus clouds appeared above lower clouds. D. WILSON-BARKER.

Greenhithe, February, 1907.

AUDIBLE METEORS.

SINCE I wrote the letter published in your February number, I have read Mr. E. Huntley's note in your November number. The meteor he saw on August 7th, 1906, was evidently a Perseid, belonging to the great annual shower of August. Several other bright Perseids were observed at various times and by different persons on the date mentioned. It is in the highest degree probable that the sound heard by Mr. Huntley had no connection whatever with the meteor seen at about the same time. The average heights of the Perseids are from 80 miles at beginning to 54 miles at ending, and sound

reaching us from such objects (even when crossing the zenith of the observer) must necessarily occupy from about $4\frac{1}{2}$ to $6\frac{1}{2}$ minutes in transmission.

Moreover the members of this system do not apparently belong to the detonating class, for they very rarely furnish audible sounds. I cannot recall a single instance of the kind supported on ample evidence—of 2990 Perseids recorded by the writer at Bristol during the years 1869–1906, not one appears to have occasioned a well-marked detonation.

Mr. J. G. Wood seems to be indiscriminately confusing bright meteors with electrical phenomena, sometimes known as "ball-lightning." There is a wide distinction between meteoric fireballs and electrical fireballs. I quite agree with Mr. C. L. Brook's interesting remarks on the subject of audible meteors. There is no question that sounds of various character (heard either instantaneously with or following meteoric outbursts) are frequently attributed to meteors when no real association exists. Some people are so peculiarly sensitive to impressions, imaginary and illusory, that it is quite customary for them to hear a hissing noise as a meteor shoots along the sky. One pretty well known astronomical observer ascribes a detonation to every conspicuous meteor which comes under his notice. On the disappearance of an object he listens attentively for a long time afterwards, and generally hears something within half-an-hour (he lives in a populous city), which he confidently connects with the meteoric explosion. But his conclusions have been proved to be erroneous in several cases where duplicate observations enabled the real paths and distances of the objects to be ascertained.

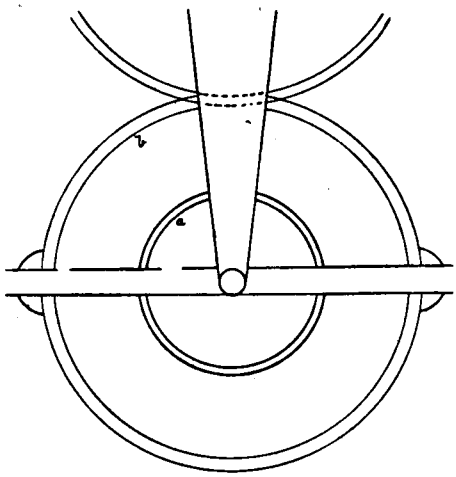
As good typical examples of large and really detonating fireballs, those of November 23rd, 1877, and January 25th, 1894, may be mentioned. But the hissing of *ordinary* meteors and shooting stars, sometimes said to occur simultaneously with their flights across the sky, is an illusion. The laws of acoustics, even if no other negative evidence were available, forbid our entertaining the idea that the sound of meteoric concussions travels with special velocity. It is far easier to believe that observers have made mistakes, and there is an abundance of evidence affording significant indication, if not convincing proof, that this is the correct explanation.

W. F. DENNING.

February 20th, 1907.

SOLAR HALO.

THE sketch shows a solar halo seen from Epsom Downs during the afternoon of February 6th last. The sky at the time of observation was covered with cirro-stratus of varying density, the sun shining through with a pale greyish gold light The inner halo (*a*) was



narrow and of a silver-grey colour, the outer halo (*b*) was brightly prismatic. The partial halo visible at the top of the diagram, cutting the outer one (*b*) was almost comparable with a rainbow in the intensity of its light. A broad bar of a silver-grey colour extended across the sun and halos, being broken only at the top to the left of the sun. Outside the halo (*b*) were circles of light of a pale yellow hue. Upwards towards the zenith there extended a ray of golden light; the halos (*a* and *b*) were invisible through this beam, but the partial halo at the top shone through, although very faintly. The phenomenon varied both in intensity of colour and completeness of outline.

SPENCER C. RUSSELL, F.R.Met.Soc.

Epsom, February 20th, 1907.

SOLAR ACTIVITY AND WEATHER.

IN your January issue (Vol. 41, p. 232), under "The Sunspot Question," a correspondent writes to point out that Professor Bigelow's results, according to a review in the November issue, are at variance with those of certain other investigators.

Professor Bigelow indicates that the solar prominences, not the spots, are the true register of the variable solar activity which synchronizes with weather conditions, and that, whereas the 3-year period in the prominence-frequency is more marked than the 11-year period in accordance with a more strongly-marked 3-year period in the variations of atmospheric pressure and temperature over the Earth's surface, the 11-year period in the frequency of spots is more conspicuous than the 3-year period. It is probably here that the discrepancy referred to by your correspondent arises.

L. C. W. B.

January 24th, 1907.

TROPICAL RAINFALL.

A FACT which came to my knowledge to-day in an official Report from the Estate may be of interest to you. At Ingrugalla Estate, Dolosbagie District, Central Province Ceylon, on December 8th, 1906, 6·37 in. of rain fell between 4.30 and 5.30 p.m. Bridges were carried away and much damage done. N. W. GRIEVE.

Groombridge, Jan. 3rd, 1907.

THE LANDER SELF-RECORDING RAIN GAUGE.

SEVERAL of your readers having gathered a somewhat incorrect impression about the clock from your otherwise very favourable account of my rain gauge in your last issue, perhaps you will kindly allow me to say that the clock and gear is the well-known barograph pattern, by one of the very best makers, and is exactly the same as supplied by a number of well-known makers in their barographs, thermographs, and other self-recording instruments. I have tried a great number of clocks of various patterns, with lever and cylinder escapements, but the one now supplied has proved itself by far the best. If it is possible to get a better one I should be glad to obtain a sample from the makers. Nothing short of a chronograph movement, with delicate temperature compensation, would keep *absolutely accurate* time when exposed out of doors, to temperatures which vary from 20° to 100° F., but such a movement is quite unnecessary and would cost far more than the price of the whole instrument.

I may say that about a dozen recent Kew certificates for my instruments fitted with these clocks state that "clock rate and time scale were found to be satisfactory." A. LANDER.

METEOROLOGICAL NEWS AND NOTES.

MR. A. LAURENCE ROTCH, the well-known founder and Director of Blue Hill Meteorological Observatory in Massachusetts, has been appointed Professor of Meteorology in Harvard University. The Blue Hill observations have been published in the *Annals of the Harvard College Observatory* for many years.

THE ROYAL METEOROLOGICAL SOCIETY at its meeting on Wednesday, 20th March, will be addressed by Major B. F. S. Baden-Powell, in a lecture on "The Exploration of the Air," illustrated by models and lantern slides, and dealing, we understand, with recent advances in the direction of obtaining observations in the free air by means of flying machines. It has been announced that the annual dinner of the Society will be held at the Trocadero Restaurant, on June 18th, and as one of the afternoon meetings of the Society takes place on the following day the opportunity is one likely to attract Fellows living in the country who have few opportunities of meeting each other.

A COURSE OF FIVE LECTURES on Dynamical Meteorology was commenced at University College, Gower Street, by Dr. W. N. Shaw, in his capacity as Reader in Meteorology in the University of London, on Friday, 22nd February. The course, for which no fee is charged, was unfortunately interrupted by the illness of the lecturer, but continues on Fridays, at 5 p.m., after Easter.

TEMPERATURE FOR FEBRUARY, 1907.

STATION.	COUNTY.	Lat. N.	Long. W. [*E.]	Height above Sea. ft.	TEMPERATURE. Max.		TEMPERATURE. Min.		No. of Nigh at or below	
		° ′	° ′		°	Date.	°	Date.	Shade.	Gras
Camden Square	*London*	51 32	0 8	111	52·0	17	23·4	24	15	21
Tenterden	*Kent*	51 4	*0 41	190	53·0	17, 28	21·0	23	16	23
West Dean	*Hampshire*	51 3	1 38	137	51·0	15, 17	15·0	2, 3	17	23
Hartley Wintney	,,	51 18	0 53	222	54·0	18, 28	16·0	2	17	22
Hitchin	*Hertfordshire*	51 57	0 17	238	51·0	17	21·0	8, 23	19	...
Winslow (Addington)	*Buckinghamshr.*	51 58	0 53	309	52·0	17	18·0	2, 23	19	21
Bury St. Edmunds (Westley)	*Suffolk*	52 15	*0 40	226	54·5	28	17·0	8	16	...
Brundall	*Norfolk*	52 37	*1 26	66	54·4	28	20·6	8	17	21
Winterbourne Steepleton	*Dorset*	50 42	2 31	316	50·8	17	18·3	3	16	20
Torquay (Cary Green)	*Devon*	50 28	3 32	12	53·4	9	24·6	24	9	19
Polapit Tamar [Launceston]	,,	50 40	4 22	315	52·6	15	18·1	3	14	23
Bath	*Somerset*	51 23	2 21	67	53·0	19, 27	17·0	3	16	...
Stroud (Upfield)	*Gloucestershire*	51 44	2 13	226	54·0	17	22·0	2, 3	15	...
Church Stretton (Woolstaston)	*Shropshire*	52 35	2 48	800	49·5	27	15·0	23	27	...
Bromsgrove (Stoke Reformatory)	*Worcestershire*	52 19	2 4	225	49·0	15†	13·0	2	...	22
Boston	*Lincolnshire*	52 58	0 1	25	53·0	27	21·0	2	19	...
Worksop (Hodsock Priory)	*Nottinghamshire*	53 22	1 5	56	55·8	15	17·1	3	19	26
Derby (Midland Railway)	*Derbyshire*	52 55	1 28	156	53·0	15‡	16·0	2	20	...
Bolton (Queen's Park)	*Lancashire*	53 35	2 28	390	50·8	15	23·0	2	17	22
Wetherby (Ribston Hall)	*Yorkshire, W.R.*	53 59	1 24	130	...	...	...	...	...	...
Arncliffe Vicarage	,, ,,	54 8	2 6	732	...	...	...	...	...	...
Hull (Pearson Park)	,, *E.R.*	53 45	0 20	6	55·0	15§	19·0	3	15	26
Newcastle (Town Moor)	*Northumberland*	54 59	1 38	201	...	...	...	...	...	...
Borrowdale (Seathwaite)	*Cumberland*	54 30	3 10	423	53·6	27	18·3	1	18	...
Cardiff (Ely)	*Glamorgan*	51 29	3 13	53	...	...	...	...	...	...
Haverfordwest (High Street)	*Pembroke*	51 48	4 58	95	51·8	15	22·2	2	11	14
Aberystwyth (Gogerddan)	*Cardigan*	52 26	4 1	83	52·0	27	18·0	1, 2	...	...
Llandudno	*Carnarvon*	53 20	3 50	72	52·0	15, 19	28·2	3	8	...
Cargen [Dumfries]	*Kirkcudbright*	55 2	3 37	80	52·0	25	15·0	1, 6	17	...
Lilliesleaf (Riddell House)	*Roxburgh*	55 31	2 46	550	55·0	27	16·0	5	22	26
Edinburgh (Royal Observy.)	*Midlothian*	55 55	3 11	442	52·1	27	21·3	1	17	19
Colmonell (Clachanton)	*Ayr*	55 8	4 54	140	54·0	18	19·0	4	13	...
Glasgow (Queen's Park)	*Renfrew*	55 53	4 18	144	51·0	27	20·0	5	16	24
Tighnabruaich	*Argyll*	55 55	5 14	50	48·0	27	22·0	21, 22	19	20
Mull (Quinish)	,,	56 36	6 13	35	51·0	27	...	...	...	...
Dundee (Eastern Necropolis)	*Forfar*	56 28	2 57	199	55·5	27	19·5	6	17	...
Braemar	*Aberdeen*	57 0	3 24	1114	...	..	...	...	...	...
Aberdeen (Cranford)	,,	57 8	2 7	120	59·0	26	24·0	5, 12	21	...
Cawdor (Budgate)	*Nairn*	57 31	3 57	250	...	...	...	...	...	...
Invergarry	*E. Inverness*	57 4	4 47	130?	...	...	...	...	...	...
Loch Torridon (Bendamph)	*W. Ross*	57 32	5 32	20	...	...	...	...	...	...
Dunrobin Castle	*Sutherland*	57 59	3 56	14	52·0	15	23·0	1	15	..
Castletown	*Caithness*	58 35	3 23	100	50·0	15, 28	23·0	11, 21	23	25
Killarney (District Asylum)	*Kerry*	52 4	9 31	178	59·0	16	27·0	5, 23	...	...
Waterford (Brook Lodge)	*Waterford*	52 15	7 7	104	53·0	17	24·0	22	12	...
Broadford (Hurdlestown)	*Clare*	52 48	8 38	167	50·0	14	24·0	7	15	...
Carlow (Browne's Hill)	*Carlow*	52 50	6 53	291	...	...	...	...	...	...
Dublin (Fitz William Square)	*Dublin*	53 21	6 14	54	55·7	15	28·4	5	14	18
Ballinasloe	*Galway*	53 20	8 15	160	...	...	...	...	...	...
Clifden (Kylemore House)	,,	53 32	9 52	105	...	...	...	...	...	...
Crossmolina (Enniscoe)	*Mayo*	54 4	9 18	74	...	...	...	...	...	...
Seaforde	*Down*	54 19	5 50	180	51.0	15	26·0	5	21	18
Londonderry (Creggan Res.)	*Londonderry*	54 59	7 19	320	...	...	...	...	...	...
Omagh (Edenfel)	*Tyrone*	54 36	7 18	280	52·0	15	25·0	5	16	...

† and 16, 17, 27 ‡ and 27, 28. § and 25, 28

RAINFALL FOR FEBRUARY, 1907.

No. of Nights at or below 32°			RAINFALL OF MONTH.							RAINFALL FROM JAN. 1.				Mean Annual 1870–1899.	STATION.
	Shade.	Grass	Aver. 1870-99.	1907.	Diff. from Av.	% of Av.	Max. in 24 hours.		No. of Days	Aver. 1870-99.	1907.	Diff. from Aver.	% of Av.		
			in.	in.	in.		in.	Date.		in.	in.	in.		in.	
	15	21	1·62	1·17	— ·45	72	·38	10	13	3·51	2·08	— 1·43	59	25·16	Camden Square
	16	23	1·85	1·42	— ·43	77	·42	12	11	4·21	2·42	— 1·79	57	28·36	Tenterden
3	17	23	2·27	1·60	— ·67	70	·51	12	12	4·95	2·45	— 2·50	50	29·93	West Dean
	17	22	2·06	1·50	— ·56	73	·44	19	8	4·45	2·16	— 2·29	49	27·10	Hartley Wintney
23	19	...	1·54	1·22	— ·32	79	·42	12	15	3·35	2·19	— 1·16	65	24·66	Hitchin
23	19	21	1·73	1·11	— ·62	64	·32	12	12	3·78	2·07	— 1·71	55	26·75	Addington
	16	...	1·55	1·53	— ·02	99	·37	10	16	3·25	2·82	— ·43	87	25·39	Westley
	17	21	1·49	1·77	+ ·28	119	·33	12	21	3·16	3·49	+ ·33	110	25·40	Brundall
	16	20	3·11	1·71	—1·40	55	·36	11	13	7·01	3·88	— 3·13	55	39·00	Winterbourne Stpltn
	9	19	2·87	1·53	—1·34	53	·58	11	11	6·06	3·26	— 2·80	54	35·00	Torquay
	14	23	2·84	1·71	—1·13	60	·44	19	16	6·71	4·44	— 2·27	66	38·85	Polapit Tamar
	16	...	2·12	1·26	— ·86	59	·32	12	12	4·64	2·49	— 2·15	54	30·75	Bath
3	15	...	2·13	1·36	— ·77	64	·25	11	14	4·59	2.66	— 1·93	58	29·85	Stroud
	27	...	2·27	1·65	— ·62	73	·35	12	16	5·08	3·41	— 1·67	67	33·04	Woolstaston
	...	22	1·63	·64	— ·99	39	·13	8	10	3·54	1·47	— 2·07	42	24·50	Bromsgrove
	19	...	1·55	1·14	— ·41	74	·50	12	11	3·14	1·92	— 1·22	61	23·30	Boston
	19	26	1·58	1·47	— ·11	93	·47	12	17	3·32	2·22	— 1·10	67	24·70	Hodsock Priory
	20	...	1·66	1·76	+ ·10	106	·38	12	15	3·61	2·91	— ·70	81	26·18	Derby
	17	22	2·67	2·48	— ·19	93	·63	11	13	6·05	4·78	— 1·27	79	42·43	Bolton
	...	...	1·63	1·80	+ ·17	110	·38	12	14	3·52	3·10	— ·42	88	26·96	Ribston Hall
	...	...	4·74	5·58	+ ·84	118	1·87	16	14	11·07	9·04	— 2·03	82	60·96	Arncliffe Vic.
	15	26	1·86	1·54	— ·32	83	·71	12	15	3·66	2·55	— 1·11	70	27·02	Hull
	...	...	1·58	1·25	— ·33	79	·33	12	15	3·54	1·73	— 1·81	49	27·99	Newcastle
	18	...	11·64	8·69	—2·95	75	2·45	16	13	26·35	14·70	—11·65	56	132·68	Seathwaite
	...	...	3·13	1·78	—1·35	57	·50	19	12	6·98	4·57	— 2·41	65	42·81	Cardiff
	11	14	3·70	2·30	—1·40	62	·64	11	14	8·83	4·58	— 4·25	52	47·88	Haverfordwest
2	...	...	3·03	2·62	— ·41	86	·44	11	18	6·90	5·96	— ·94	86	45·41	Gogerddan
	8	...	1·97	1·55	— ·42	79	·37	18	15	4·54	2·97	— 1·57	65	30·98	Llandudno
6	17	...	3·62	2·97	— ·65	82	·84	10	9	8·16	4·99	— 3·17	61	43·43	Cargen
	22	26	2·41	1·09	—1·32	45	·56	19	13	5·01	2·13	— 2·88	43	33·04	Riddell House
	17	19	...	1·01	...	...	·40	19	10	...	1·85	...	...	...	Edinburgh
	13	...	3·67	2·60	—1·07	71	·43	10	10	8·19	5·10	— 3·09	62	44·85	Colmonell
	16	24	2·53	2·68	+ ·15	106	·65	16	13	5·78	4·54	— 1·24	79	35·80	Glasgow
22	19	20	4·57	4·64	+ ·07	102	·70	19	17	10·43	8·74	— 1·69	84	57·90	Tighnabruaich
	...	...	4·50	4·52	+ ·02	100	·66	7	22	10·35	9·11	— 1·24	88	57·53	Quinish
	17	...	2·10	1·00	—1·10	48	·40	19	12	4·20	1·95	— 2·25	46	28·95	Dundee
	...	...	2·70	2·36	— ·34	87	...	...	...	5·61	3·97	— 1·64	71	36·07	Braemar
12	21	...	2·43	1·87	— ·56	77	·36	12	16	4·75	3·76	— ·99	79	33·01	Aberdeen
	...	...	1·86	2·03	+ ·17	109	·66	19	9	4·00	3·73	— ·27	93	29·37	Cawdor
	...	...	4·89	7·07	+2·18	145	1·21	16	13	11·52	13·43	+ 1·91	117	56·00	Invergarry
	...	...	6·77	11·93	+5·16	176	1·09	20	23	15·52	21·41	+ 5·89	138	86·50	Bendamph
	15	..	2·39	3·16	+ ·77	132	1·04	19	11	5·01	7·28	+ 2·27	145	31·60	Dunrobin Castle
21	23	25	...	3·01	...	...	·70	19	21	...	6·90	...	...	...	Castletown
23	...	...	5·44	2·38	—3·06	44	·43	12	19	12·01	4·76	— 7·25	40	58·11	Killarney
	12	...	3·30	1·87	—1·43	57	·59	11	15	7·36	2·66	— 4·70	36	39·30	Waterford
	15	...	2·19	2·21	+ ·02	101	·59	11	15	5·17	3·65	— 1·52	71	33·47	Hurdlestown
	...	...	2·61	...	...	...	...	...	...	5·76	..	...	...	34·44	Carlow
	14	18	1·98	1·30	— ·68	66	·38	11	14	4·14	1·73	— 2·41	42	27·75	Dublin
	...	...	2·48	...	...	...	...	...	...	5·97	...	...	...	37·04	Ballinasloe
	...	...	6·08	4·46	—1·62	73	·72	8	16	13·94	8·29	— 5·65	59	80·23	Kylemore House
	...	...	4·01	3·93	— ·08	98	·37	19	24	9·01	7·23	— 1·78	80	50·50	Enniscoe
	21	18	2·97	2·04	— ·93	69	·45	19	16	6·60	3·43	— 3·17	52	38·61	Seaforde
	...	...	2·73	4·11	+1·38	151	·95	20	20	6·29	7·58	+ 1·29	121	41·20	Londonderry
	16	...	2·49	2·72	+ ·23	109	·35	16	18	5·83	4·97	— ·86	85	37·85	Omagh

SUPPLEMENTARY RAINFALL, FEBRUARY, 1907.

Div.	STATION.	Rain. inches	Div.	STATION.	Rain. inches
II.	Abinger Hall	2·00	XI.	Rhayader, Tyrmynydd	...
,,	Ramsgate, West Cliff Villas	1·26	,,	Lake Vyrnwy	4·41
,,	Hailsham	1·55	,,	Llangyhanfal, Plâs Draw	1·75
,,	Crowborough, Uckfield Lodge	2·23	,,	Criccieth, Talarvor	1·95
,,	Osborne, Newbarn Cottage.	1·37	,,	Llanberis, Pen-y-pass	2·23
,,	Emsworth, Redlands	1·44	,,	Lligwy	1·76
,,	Alton, Ashdell	2·01	,,	Douglas, Woodville	2·59
,,	Newbury, Welford Park	1·70	XII.	Stoneykirk, Ardwell House	1·75
III.	Harrow Weald, Hill House.	1·31	,,	Dalry, The Old Garroch	5·03
,,	Oxford, Magdalen College..	1·04	,,	Langholm, Drove Road	3·28
,,	Bloxham Grove	1·18	,,	Moniaive, Maxwelton House	3·35
,,	Pitsford, Sedgebrook	1·25	XIII.	N. Esk Reservoir [Penicuick]	3·10
,,	Huntingdon, Brampton	1·00	XIV.	Maybole, Knockdon Farm..	2·10
,,	Wisbech, Bank House	1·22	XV.	Campbeltown, Witchburn...	2·75
IV.	Southend Water Works	1·20	,,	Inveraray, Newtown	7·87
,,	Colchester, Lexden	·83	,,	Ballachulish House	9·73
,,	Newport, The Vicarage	1·32	,,	Islay, Eallabus	4·97
,,	Rendlesham	·65	XVI.	Dollar Academy	3·67
,,	Swaffham	1·32	,,	Loch Leven Sluice	2 40
,,	Blakeney	1·35	,,	Balquhidder, Stronvar	7·68
V.	Bishops Cannings	1·24	,,	Perth, Pitcullen House	1·46
,,	Ashburton, Druid House	2·60	,,	Coupar Angus Station	1·26
,,	Okehampton, Oaklands	2·06	,,	Blair Atholl	3·47
,,	Hartland Abbey	1·63	,,	Montrose, Sunnyside Asylum	2·21
,,	Lynmouth, Rock House	2·39	XVII.	Alford, Lynturk Manse	1·61
,,	Probus, Lamellyn	1·81	,,	Keith Station	1·66
,,	Wellington, The Avenue	1·53	XVIII.	N. Uist, Lochmaddy	3·15
,,	North Cadbury Rectory	1·03	,,	Alvey Manse	2·53
VI.	Clifton, Pembroke Road	1·81	,,	Loch Ness, Drumnadrochit.	2·90
,,	Ross, The Graig	·87	,,	Glencarron Lodge	10·02
,,	Shifnal, Hatton Grange	1·06	,,	Fearn, Lower Pitkerrie	1·14
,,	Cheadle, The Heath House.	1·89	XIX.	Invershin	2·66
,,	Blockley, Upton Wold	1·64	,,	Altnaharra	4·40
,,	Coventry, Kingswood	1·04	,,	Bettyhill	2·12
VII.	Market Overton	1·20	,,	Watten Station	1·54
,,	Market Rasen	1·83	XX.	Dunmanway, The Rectory..	3·37
,,	Bawtry, Hesley Hall	1·11	,,	Cork	1·86
VIII.	Neston, Hinderton Lodge...	1·32	,,	Darrynane Abbey	4·04
,,	Southport, Hesketh Park...	1·70	,,	Glenam [Clonmel]	2·02
,,	Chatburn, Middlewood	3·49	,,	Ballingarry, Gurteen	1·79
,,	Cartmel, Flookburgh	2·50	,,	Miltown Malbay	3·99
IX.	Langsett Moor, Up. Midhope	3·57	XXI.	Gorey, Courtown House	1·42
,,	Scarborough, Scalby	1·85	,,	Moynalty, Westland	2·57
,,	Ingleby Greenhow	1·55	,,	Athlone, Twyford	2·38
,,	Mickleton	2·38	,,	Mullingar, Belvedere	2·80
X.	Bardon Mill, Beltingham	1·46	XXII.	Woodlawn	2·84
,,	Ewesley, Fallowlees	2·22	,,	Westport, Murrisk Abbey..	...
,,	Ilderton, Lilburn Cottage...	1·57	,,	Collooney, Markree Obsy..	3·28
,,	Keswick, York Bank	3·46	XXIII.	Enniskillen, Portora	3·07
XI.	Llanfrechfa Grange	2·58	,,	Warrenpoint, Summer Hill.	·78
,,	Treherbert, Tyn-y-waun	4·88	,,	Banbridge, Milltown	1·45
,,	Carmarthen, The Friary	2·74	,,	Belfast, Springfield	2·35
,,	Castle Malgwyn [Llechryd].	1·76	,,	Bushmills, Dundarave	2·64
,,	Plynlimon	5·40	,,	Stewartstown, The Square..	2·95
,,	Tall-y-llyn	1·60	,,	Killybegs	5·66
,,	New Radnor, Ednol	2·57	,,	Horn Head	4·53

METEOROLOGICAL NOTES ON FEBRUARY, 1907.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Temp. for Temperature; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; TS for Thunderstorm; R for Rain; H for Hail; S for Snow.

LONDON, CAMDEN SQUARE.—The first week was dry and frosty, but the anticyclonic conditions gave way on 7th and overcast and damp weather followed without much rise of temp. The second half of the month was milder, with considerable sunshine and, after 20th, no R. Duration of sunshine 53·7* hours and of R 23·4 hours. Mean temp. 37°·8, or 2°·0 below the average.

CROWBOROUGH.—The first 8 days were cold and thaw set in on 9th, but there was another spell of severe frost from 19th to 24th. Mean temp. 37°·5. R ·14 in. below the average of 36 years.

HARTLEY WINTNEY.—Frost and a little fog until 10th, followed by R. The last week was bright and cold. Splendid display of aurora borealis from 9 p.m. till midnight on 9th. Terrible storm of N.E. wind on 19th and 20th. Ozone occurred every day, with a mean of 3·2.

NORTH CADBURY.—A cold and quiet month, closely parallel to those of 1901 and 1902. The R was small, making that of the three winter months far the lowest in 11 years. Vegetation was late and the pond extremely low.

CLIFTON.—The first week was fine and frosty, with N.E. winds; then warmer, with R nearly every day till 21st and S on 19th, 20th and 21st. The last week was dry, with N.W. winds. R ·66 in. below the average.

BOLTON.—A normal month. The first week was cold and dull but fair and no R fell till 8th. The temp. was above the average from 8th to 19th, with R on every day but one. Fair weather again on 21st, though the last week was dull and misty. Duration of sunshine 43·7* hours, or 4·1 hours above the average. Mean temp. 39°·5, or 1°·8 above the average. An aurora of unusual brilliancy was seen on 10th.

SOUTHPORT.—Extremely sunny, the total duration being 98·2* hours, or 29·6 hours above the average. The mean temp., 37°·2, was 1°·8 below the average, the weather being very cold till 8th. R ·36 in. below the average; duration 28·5 hours. Water levels were considerably lower than usual.

CARMARTHEN.—Very cold and dry, water supplies becoming low. Frost prevented fruit trees from budding too early, thus improving the prospect of fruit.

HAVERFORDWEST.—Cold and changeable, with small R. Severe gale on 19th, 20th aud 21st. Fine aurora on 9th. Duration of sunshine 86·4* hours.

DOUGLAS.—Wintry with much, but not severe, frost. The first two and the fourth weeks had considerably below the average temp., but the third was wet and mild, with violent westerly gales and high seas on 19th and 20th. The R was below the average and the land where properly watered was in excellent condition.

DUMFRIES.—The early part was marked by low temp. and constant S showers. An aurora borealis of exceptional brilliancy on 9th ushered in a change to almost continuous R for 10 days. Vegetation was late and farm work in arrears.

COUPAR ANGUS.—The mean temp., 35°·8, was about the average, but the month was noteworthy for the long period of severe frost and drifting S. A welcome change to mild weather set in at the close.

BLAIR ATHOLL.—S lay on the ground for 29 days from January 24th, and continuous feeding of hill stock was necessary in the neighbourhood.

DRUMNADROCHIT.—R ·05 in. below, and rain days equal to, the average of 21 years. The month was notable for gales and S and for the fine display of aurora borealis on 9th.

WATERFORD.—R 1·15 in. below the average. Mean temp. 39°·9.

DUBLIN.—A cold month, the mean temp. being 40°·3, or 2°·2 below the average. At first quiet anticyclonic weather, followed by a warm period from 13th to 19th and then a very cold spell. Overcast, quiet and anticyclonic from 22nd to the close. Stormy from 16th to 20th. Fine aurora borealis on 9th.

* Campbell-Stokes.

Climatological Table for the British Empire, September, 1906.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp.	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Average. Dew Point.	Average. Humidity.	Absolute. Max. in Sun.	Absolute. Min. on Grass.	Total Rain. Depth.	Total Rain. Days.	Aver Cloud.
	°		°		°	°	°	0-100	°	°	inches		
London, Camden Square	94·0	2	39·0	28	70·5	50·6	52·4	78	131·5	35·4	1·75	8	...
Malta	...	...	...	...	...	...	...	...	...	...	..	...	...
Lagos	86·0	13*a*	71·0	18*b*	83·3	73·3	72·1	79	141·0	69·0	1·67	15	8·0
Cape Town	74·1	21	38·3	2	63·6	48·9	47·9	73	...	...	·99	7	3·7
Durban, Natal	80·4	15	54·4	26*c*	74·0	59·1	...	...	137·4	...	3·84	13	4·7
Johannesburg	79·5	16	35·0	26	70·7	48·3	46·0	68	143·8	30·0	·51	2	2·7
Mauritius	79·9	30	54·1	25	75·5	61·2	58·4	73	148·7	46·3	1·73	18	5·7
Calcutta	92·4	1, 21	75·4	12	87·7	78·6	77·9	87	157·0	74·8	8·30	13	8·5
Bombay	87·5	20	75·4	21	85·1	77·3	74·9	82	137·0	71·8	3·94	18	6·4
Madras	99·4	13	72·3	20	92·9	77·5	74·6	78	147·9	72·3	6·27	14	5·9
Kodaikanal	67·1	30	47·6	29	62·8	51·4	50·4	81	141·2	37·2	4·93	16	6·3
Colombo, Ceylon	88·4	29	74·8	29	87·1	78·5	72·8	77	150·2	73·5	·05	2	6·3
Hongkong	90·3	28	73·4	12	85·3	77·0	74·2	80	146·5	...	30·60	21	7·0
Melbourne	76·1	26	36·0	7	52·6	48·8	45·0	76	139·2	28·8	3·84	8	6·7
Adelaide	77·2	25	36·9	6	64·8	47·5	46·9	71	136·4	55·1	3·37	15	5·8
Coolgardie	79·0	28	33·2	16	67·0	43·5	39·9	57	145·4	30·0	·16	3	4·4
Sydney	70·0	6, 27	44·1	16	64·5	51·4	49·1	74	111·5	36·2	1·36	25	5·9
Wellington	61·1	16	38·5	6	55·1	42·2	41·7	74	130·0	30·0	3·04	15	6·0
Auckland	64·0	28	43·0	12	58·9	48·1	45·2	74	128·0	36·0	4·32	14	6·3
Jamaica, Negril Point	92·9	19	70·6	29	87·8	74·0	75·0	79	...	...	4·46	9	...
Trinidad	92·0	11	68·0	20	89·1	71·3	74·0	85	161·0	68·0	6·54	20	...
Grenada	88·4	16	73·4	23	86·0	76·3	73·3	78	150·0	...	4·27	14	3·0
Toronto	90·4	9	41·7	25	75·2	54·5	56·7	75	116·5	36·2	...	...	2·9
Winnipeg	99·0	7	31·0	27	74·7	46·9	...	...	...	...	1·51	8	4·7
St. John's, N.B.	76·0	19	39·8	25	62·7	50·3	...	...	...	...	1·91	11	4·7
Victoria, B.C.	71·7	1	42·2	11	63·3	49·6	...	83	...	...	3·14	11	6·4
Dawson	68·0	1	15·0	28	55·0	31·7	...	...	...	...	1·14	8	5·8

a and 14. *b* and 21. *c* and 27.

Johannesburg.—First TS of the season on the 18th, absolute drought lasted 123 days.

Mauritius.—Mean temp. of air 1°·9, dew point 1°·8, below, and R ·33 in. above average. Mean hourly velocity of wind 10·4 miles, or 1·6 below average.

KODAIKANAL.—Bright sunshine 134 hours.

COLOMBO.—Mean temp. of air 82°·4, or 1°·5 above, of dew point 0°·5 below, and R 5·00 in. below, averages. Mean hourly velocity of wind 9·7 miles.

HONGKONG.—Mean temp. of air 81°·0. Bright sunshine 171·2 hours, or 30 hours below average. R 22·38 in. above average. Mean hourly velocity of wind 16·7 miles, or 4·9 above average. Gales on 18th, 20th, and 29th.

Adelaide.—Mean temp. of air 0°·8 below, and R 1·66 in. above, averages. One of the wettest Septembers on record. Sunshine 19 hours below average.

Coolgardie.—Mean temp. of air 3°·1, and R ·62 in. below averages of 13 years.

Sydney.—Mean temp. of air 0°·8 below, and R 1·56 in. below, averages.

Wellington.—Mean temp. of air 1°·9 below, and R 1·48 in. below, averages.

TRINIDAD.—R ·89 in. below 43 years average.

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THE RAINFALL OF THE SIX WINTER MONTHS.

October, 1906—March, 1907.

The month of March has been acclaimed in the London press as almost a miracle of fine weather. The warmth and brilliance of every morning in the latter half of the month, outside the fog zone of the metropolis, justified the quotation,

> "Oh what a dawn of day,
> How the March sun feels like May!"

but, taken as a whole, the month was warm and dry only in the south of England and the extreme south of Ireland. Along the south coast from Kent to Cornwall there was less than half the average rainfall, and Torquay was unfortunate enough to record scarcely more than a quarter of the rain it was entitled to expect in a normal month, and on which so much of its climatic advantage depends; but as on former occasions the serious shortage was apparently confined to a small area. In the north-west of England, and in the west of Scotland, March proved somewhat wetter than the average, and in a small area in the north of Ireland the fall was nearly twice the average, Omagh appearing to have been the centre of heaviest rain in the British Isles.

March concludes what may be termed the winter half-year, and a great deal of the comfort of the succeeding summer, especially to the dwellers in large towns, depends upon the rainfall of those months. It is obvious that when growth ceases in autumn, and while temperature is low in winter, and evaporation from the soil is practically suspended, all the water that falls upon the land is free either to run off into the rivers or to soak through the soil and replenish underground water supplies. When the leaves unfold, and grass and all vegetation are in full growth in April, and when the temperature rises and evaporation equals or exceeds the rainfall in summer, it is plain that but little of the falling rain can run the gauntlet of the eager hands on the surface stretched out to catch and absorb it, so that, save in exceptional circumstances, the winter six months alone are effectual in filling wells and reservoirs to be drawn upon in the following summer.

The winter half-year just passed is divided by the turn of the year into three wet months in 1906, and three dry months in 1907, taking the country as a whole; but both halves of the period were wet in the west of Scotland and the north of Ireland. The figures for each month have been published in this Magazine, those for March, 1907, appearing on p. 59. The accompanying Table gives the aggregate rainfall in inches and also as percentages of the thirty years' average for the two periods of three months, and for the whole six months. It shows that the aggregate rainfall of the three months. October—December, 1906, exceeded the average in all parts of Great Britain, except round the coast from the Mersey to the Solway, and in a small area of South Devon. The excess was greater on the eastern than on the western side of the country, but it amounted to 50 per cent. only in a small area in the north Midlands. Ireland had rainfall exceeding the average only in the extreme north, and at one station in the south-west. For these three months the general rainfall of England exceeded the average by 25 per cent., that of Scotland by 15 per cent., while that of Ireland fell short of the average by 5 per cent. Looked at as a whole the general rainfall of the British Isles exceeded the average by 16 per cent.

The first three months of 1907 were remarkably dry in all parts of the country, though we believe not unprecedentedly dry in any case where a long record is available for comparison. The Table shows that in the north-west of Ireland, the west and north of Scotland, and in the east of Norfolk, the rainfall exceeded the average; but in the south of Ireland, and in the south-west of England, from Hampshire to Devon, it was less than half the average; this, for so long a period as three months, being a very unusual circumstance. The general rainfall of England and Wales for these three months, fell short of the average for the first quarter of the year by 33 per cent., that of Scotland by 11 per cent., and that of Ireland by 21 per cent. For the whole of the British Isles, the rainfall of the three months was 25 per cent. less than the average. The deficiency was greater than the excess of the previous three months in England and Wales, and in Scotland; but it must be remembered that the average rainfall of the last three months of the year is considerably greater than the average rainfall of the first three months of the year, in all parts of the country, and thus the state of matters is not so serious as might appear at first sight.

Taking the winter six months into account, as a whole, the Table shows that the whole of the east of England, an area in this instance bounded by a line running from Dungeness to Liverpool, and thence to Berwick-on-Tweed, had distinctly more than the average rainfall, the excess coming to a maximum of over 25 per cent. in Norfolk and considerably exceeding 10 per cent. over the great water-gathering grounds of the Pennine chain. Wales, the Lake District, and the whole south-west of England, had in a corresponding degree a deficiency of rain, amounting to more than 25 per cent. in the east

Rainfall, October, 1906—March, 1907.

STATION.	Oct. —Dec., 1906.	Jan. —Mar., 1907.	Oct., 1906 —Mar., 1907.	Per cent. of Average. Oct. —Dec., 1906.	Jan. —Mar., 1907.	Oct., 1906 —Mar., 1907.
	in.	in.	in.			
London (Camden Square)	9·56	3·05	12·61	129	59	100
Tenterden	12·34	3·30	15·64	129	54	100
West Dean	11·77	2·99	14·76	124	44	91
Hartley Wintney	11·16	3·16	14·32	129	51	96
Hitchin	10·42	3·16	13·58	142	65	111
Winslow (Addington)	10·03	3·21	13·24	129	59	100
Bury St. Edmunds (Westley)	10·81	3·84	14·65	149	79	121
Brundall	11·15	4·88	16·03	143	101	127
Winterbourne Steepleton	14·31	4·89	19·20	108	52	85
Torquay (Cary Green)	9·53	3·92	13·45	85	46	68
Polapit Tamar [Launceston]	14·44	5·85	20·29	106	64	89
Bath	9·78	3·19	12·97	108	49	83
Stroud (Upfield)	10·64	3·35	13·99	124	52	93
Church Stretton (Woolstaston)	11·31	4·75	16·06	160	67	93
Bromsgrove (Stoke Reformatory).	8·42	2·10	10·52	124	43	90
Boston	9·28	3·38	12·66	142	75	115
Worksop (Hodsock Priory)	10·26	3·60	13·86	149	74	118
Derby (Midland Railway)	9·75	4·29	14·04	133	84	113
Bolton (Queen's Park)	17·00	8·65	25·65	133	97	118
Wetherby (Ribston Hall)	10·99	4·81	15·80	145	90	122
Arncliffe Vicarage	23·45	16·29	39·74	124	101	113
Hull (Pearson Park)	10·63	3·78	14·41	132	69	107
Newcastle (Town Moor)	11·81	2·86	14·67	144	51	106
Borrowdale (Seathwaite)	41·47	28·80	70·27	99	78	89
Cardiff (Ely)	14·27	6·28	20·55	106	64	88
Haverfordwest (High Street)	17·87	6·11	23·98	110	52	85
Aberystwyth (Gogerddan)	15·13	8·52	23·65	103	87	96
Llandudno	10·18	4·90	15·08	98	75	89
Cargen [Dumfries]	13·17	9·32	22·49	97	83	91
Colmonell (Clachanton)	17·92	8·50	26·42	122	75	101
Glasgow (Queen's Park)	13·27	8·48	21·75	128	105	118
Tighnabruaich	22·43	15·46	37·89	123	105	115
Mull (Quinish)	19·21	14·17	33·38	101	97	99
Dundee (Eastern Necropolis)	9·20	3·75	12·95	112	61	90
Braemar	14·35	5·69	20·04	129	71	105
Aberdeen (Cranford)	14·73	5·29	20·02	147	74	116
Cawdor (Budgate)	11·22	5·93	17·15	140	96	121
Invergarry	21·26	19·52	40·78	117	119	118
Loch Torridon (Bendamph)	32·23	30·76	62·99	112	140	124
Dunrobin Castle	14·32	9·27	23·59	144	124	135
Killarney (District Asylum)	14·39	7·83	22·22	78	49	64
Waterford (Brook Lodge)	10·55	3·75	14·30	86	38	65
Broadford (Hurdlestown)	10·30	6·39	16·69	106	87	98
Abbey Leix (Blandsfort)	9·44	5·15	14·59	93	64	80
Dublin (FitzWilliam Square)	6·69	3·66	10·35	83	61	74
Ballinasloe	9·31	7·53	16·84	87	89	88
Clifden (Kylemore House)	20·94	13·05	33·99	83	66	76
Crossmolina (Enniscoe)	15·58	12·07	27·65	95	93	94
Seaforde	11·51	6·45	17·96	101	70	87
Londonderry (Creggan Reservoir).	14·89	12·82	27·71	115	137	124
Omagh (Edenfel)	12·79	9·89	22·68	116	119	117

of South Devon, and approaching 10 per cent. over the great water-gathering grounds of Wales. It would thus appear more likely that shortage of water would occur in the course of the coming summer in the large towns supplied from Wales and the Lake District, than in those supplied from the Pennine chain, if other things were equal. As a matter of fact, however, the Welsh supplies being of more recent origin have probably a larger margin of reserve to draw upon, and unless there is an unusually hot and dry summer, shortage of water is more likely to be felt in the south and south-west of England, than in other localities.

For England and Wales as a whole the general rainfall of the six months was exactly the average; for Scotland it showed an excess of only 4 per cent., while in Ireland, where both periods had been dry, there was a deficiency of 12 per cent., the deficiency being greatest in the south, where it was more than 25 per cent., and disappearing in the extreme north, where there was on the other hand an excess of more than 20 per cent. The six months for the whole of the British Isles showed a deficiency of rainfall amounting to 2 per cent.; so that, speaking generally, the total amount of water deposited on our islands in the winter six months of 1906–07 did not differ appreciably from the average amount of the last thirty years, though there were peculiarities of distribution both in space and time. The detailed Table may for convenient reference be summarised as follows:—

General Rainfall for the Winter six months, 1906–07, as percentage of average.

	England and Wales.	Scotland.	Ireland.	British Isles.
Oct.–Dec., 1906.....	125	115	95	116
Jan.–Mar., 1907	67	89	79	75
Oct., 1906–Jan., 1907 ...	100	104	88	98

REMARKS ON A WATERSPOUT AND ACCOMPANYING PHENOMENA, ENCOUNTERED IN THE EUXINE.

By Reginald Page.

On the 14th July, 1906, the British steamer *Dalyarth* left the port of Novorossisk, laden with a cargo of oil-cake for the Baltic. During the spell in harbour the weather had been very hot, with a larger amount of rain than usual. On the 15th, when about 100 miles from Novorossisk on her course towards the Bosphorus, the officer of the watch observed heavy waterspouts to the northward about 8 a.m. There appeared three funnel-like spouts, separated in the columnar portions, but in the cone or upper part all uniting in a heavy mass of nimbus; the sky was mostly clear, a few low-lying cirro cumulus cloud-banks and bright, clear sunshine. The vessel, now steaming full speed, soon dropped these out of sight.

On the evening of that day the sun set behind heavy cloud-banks, and after the twilight had died away the heavens were aflame with incessant lightning. At 10 p.m. the captain was called as the vessel was abreast of Kilia Point Light—the light, however, being obscured by heavy rain clouds—and the engines were then slowed down in order that the steamer should not arrive at the Bosphorus before daylight; no vessels are allowed to enter Ottoman waters between sunset and sunrise. At midnight the scene was most impressive: sky clouded in, and over the land the lightning revealed the columns of four waterspouts, or one waterspout having four columns, each of which appeared to reach the water; the lightning was now incessant and vivid, and appeared to be confined to the vicinity of the waterspout, enabling the latter to be plainly discerned; the columns appeared to be quite black, but the spaces in between them showed up with a coppery hue; over the top an impenetrable cloud of black nimbus joined the four columns in one. The spouts were growing in magnitude and apparently moving directly towards the steamer accordingly she was headed west and the engines were put full speed ahead in order to allow the waterspout to pass astern of the steamer,

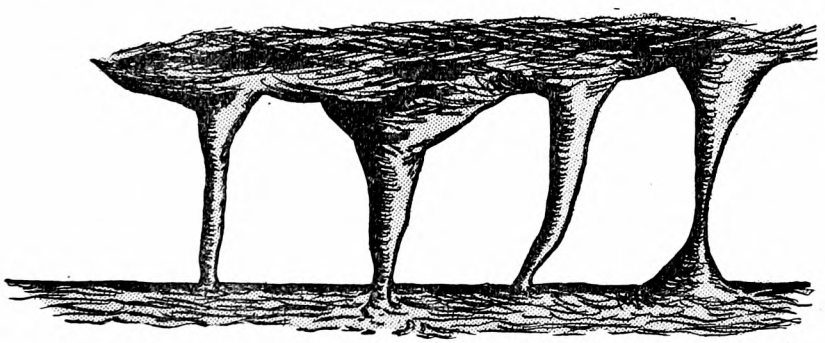

Fig 1.

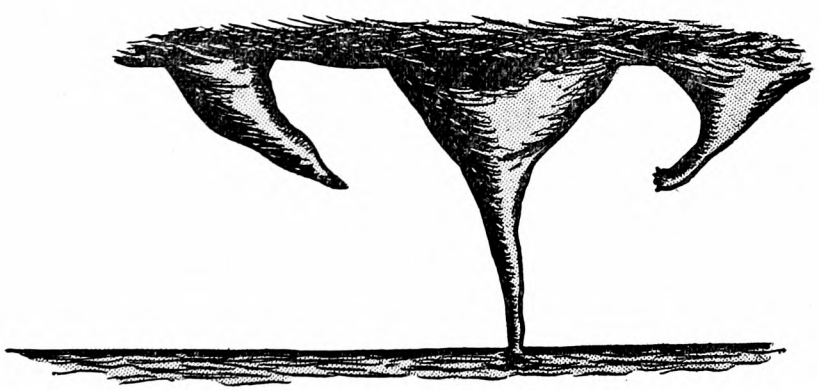

Fig.2.

About 1 a.m., as the waterspout appeared to be approaching, the course was altered to the north, thus bringing the waterspout astern; it is curious to note that though the steamer was proceeding west at her full speed the position of the waterspout in relation to the steamer remained unchanged. During this time there was no wind, yet the progress of the waterspout must have been about 15 miles per hour; as the vessel proceeded north the spout still gained, and about 2 a.m. the centre of the disturbance passed alongside and to the east of the steamer, at a distance of perhaps half-a-mile. There was a sound of broken water, resembling distant surf on a beach; a terrific deluge of rain, which obscured all view of the waterspout—even the lightning failed to penetrate through the downpouring sheets of water. The falling water was fresh.

About 3 a.m. the rain ceased and the waterspout was visible to the north-east, having now only one column reaching to the water, and two smaller columns, each of which was bending towards the rain column and no longer reaching the sea. The spout was finally lost to view amid a black mass of nimbus as day dawned. Dead fish were lying on the surface of the water, and some had even fallen on the deck of the steamer. During the passage of the waterspout the sea was considerably disturbed, the vessel rolling slightly to the swell caused by it.

SCOTTISH METEOROLOGICAL SOCIETY.

THE Half-yearly General Meeting of this Society was held on the afternoon of March 19th, at 5, St. Andrew Square, Edinburgh, Professor Crum Brown in the chair.

The following report from the Council was read:—

There has been no change in the Society's Stations since the Meeting in July.

The following Stations have been inspected since July by Mr. Watt:—Aberdeen, Balmoral, Peterhead, Glasgow (Belvedere Hospital), Leadhills, and Dumfries.

It is at this Meeting that the annual election of Office-Bearers takes place. The Members of Council who retire by rotation are Professor J. G. M'Kendrick, Sir James Marwick, and the Hon. John Abercromby. The Council recommend the re-election of the Hon. John Abercromby, and the election of Sir Archibald Buchan-Hepburn, Bart., of Smeaton, and Mr. Henry Coates, F.R.S.E., in place of the other two gentlemen.

The Registrar-General for Scotland has been regularly supplied with the Monthly and Quarterly Reports from the Office of the Society, and also, direct from the Observers in the eight large towns of Scotland, with the Daily Observations of Temperature and Rainfall required for his Weekly Reports.

The Meteorological Office in London has received direct from the Observers at Lairg, Glencarron, Balmoral, Fort Augustus, Fort William, Clathick, Marchmont, Dumfries, and Cally, Daily Observations of Tem-

perature, Rainfall, and, in some cases, Sunshine, for their Weekly Weather Reports.

Meteorological Statistics have been sent as usual to several Medical Officers of Health in various parts of Scotland for their Annual Reports.

The Council have appointed Mr. Andrew Watt, M.A., F.R.S.E., Assistant Meteorological Secretary. The Council have also agreed that Mr. Watt should occasionally deliver Lectures, under the auspices of the Society, on subjects of popular interest connected with Meteorology.

The Council have much pleasure in announcing the receipt of a donation of £100 from the Hon. John Abercromby.

Dr. Buchan's time has been very largely devoted to the carrying on of the general discussion of the Ben Nevis records. In connection with this discussion he has investigated the occurrence of Thunder and Lightning in Scotland, and a Paper on this subject will be communicated to the Meeting to-day.

Dr. Buchan communicated a paper on "Thunderstorms in Scotland," in the preparation of which he had been assisted by Mr. Herbert Bell, M.A., B.Sc. The weather journals of the keepers of the Scottish lighthouses had been analysed for the 21-year period, 1884-1904, and the annual and diurnal periods of thunderstorms, of thunder alone, and of lightning as an independent phenomenon, were discussed. It was pointed out that whilst thunderstorms had a maximum frequency about 5 p.m., thunder alone appeared to have a maximum earlier by some two hours; the morning hours of minimum frequency differed in the same way. In the case of the Ben Nevis records there was a similar difference of phase, but lightning alone, as observed from the high-level station, had a very distinct midnight maximum, as was the case over the ocean, whilst at lower levels the greatest frequency was some hours earlier. As had already been shown in the case of rainfall, there was a well-marked 11-year period in the occurrence of thunderstorms in Scotland; at least, that was the case for the time under discussion, during which thunderstorms were unusually frequent about 1884 and 1895. It was of great interest to note that this periodicity was in entire agreement with that shown by Steen to exist for Scandinavia and Denmark, the sympathy with Denmark being extremely close.

A paper by Mr. R. T. Omond on "Variations in Mean Monthly Temperatures at Edinburgh," was based on the statistics of R. C. Mossman's memoir on the climate of Edinburgh, and dealt with the 100-year period, 1801-1900.

(1). Comparing the average temperature of each month with the 100-year normal for the month, it was at once apparent that the range of difference was much greater in winter than in summer. Thus, for January and July we had:—

	JANUARY.		JULY.
Normal	37°·1	.....	58°·5
Highest	44·6 in 1898	.....	64·0 in 1852
Lowest	26·5 ,, 1814	.....	54·4 ,, 1879
Range	18·1	.....	9·6

(2). Considering the average departures from the normal, a similar contrast was found between summer and winter. Thus, the average departure for the three winter months was 2°·5, whilst for the summer period, June—August, it was hardly 1°·5. The causes of these contrasts between the extreme seasons were discussed.

(3). The most frequently occurring temperature for each month was considered, and it was found that the "Scheitelwerth," or Median Value, was in winter about 2° *above* the normal, and in summer about 1° *below*. In spring and autumn there was a fair agreement between the normal and the most frequent value, and these results were in accordance with what had been found for some other places in Europe. In winter a large number of cases with a + departure were balanced by a smaller number of cases with a large — departure, and the opposite held good in summer. The explanation was pointed out: Our skies might be said to be normally cloudy, but when a period of comparatively clear sky did occur, then in winter terrestrial radiation was active at night with low temperatures. In summer, on the other hand, during a clear period, solar radiation was very effective, and the air had not time to cool down much during the short night. In spring and autumn, however, a clear sky both raised the day temperature and lowered that of the night, leaving the monthly mean but little affected.

Discussion followed the reading of both papers, and the authors were thanked for their contributions.

ROYAL METEOROLOGICAL SOCIETY.

THE March meeting of this Society is always the popular night of the session, and Wednesday evening, the 20th ult., was no exception to the rule. The large hall of the Institution of Civil Engineers was crowded with Fellows and their friends, who had gathered together to hear Major B. Baden-Powell deliver a lecture on "The Exploration of the Air."

The President, Dr. H. R. Mill, said that during the last few years special attention had been directed to the study of the free atmosphere at heights far above the ground. Previously the study of meteorology was scarcely concerned with anything but the phenomena at the Earth's surface, and meteorologists only felt competent to deal with those layers of the air immediately around them. They were now beginning to rise in the air, if not in the world, and were looking eagerly at regions of the atmosphere which formerly lay entirely beyond their reach. Efforts had been made by the Royal Meteorological Society to encourage the renewal of research by means of kites and balloons, and Mr. Dines, who had done so much in this way, had on more than one occasion described his work to them. That evening they were to have the pleasure of having a lecture from one of the pioneers in the use of kites, and some of

the lantern slides which the lecturer would show, would be something of a revelation to most of them.

Major B. F. S. Baden-Powell began his lecture by saying that the atmosphere forms a vast ocean above us—an ocean but little explored. We crawl about the ground like crabs on the bottom of the sea. We make our meteorological observations down on the ground, ignorant of all that is going on in the midst of that great expanse of air above our heads where the clouds hang about; where the rain and the hail are formed; where the lightning flashes have their origin. We look to the cross of St. Paul's, or the top of the Eiffel Tower, as the most exalted of points at which to observe the mechanism of the atmosphere; yet these compare to the aerial ocean but as a pin stuck in the carpet does to the air of a room. If all the clouds in the sky were suddenly solidified in their various shapes and different elevations, what vast realms of unexplored territory there would be. But even though not solid land, there is still plenty to explore in these regions of ever-changing cloudland. If we can mount up among them, we can ascertain the temperature, the humidity, the air pressures, the electrical effects, and many other points on which we are at present very ignorant.

Major Baden-Powell stated that there are two classes of people interested in the exploration of the atmosphere: (1) The meteorologists, who study it chiefly to find out about the weather; and (2) the inventors, who would utilise it as a highway of travel. But these two are by no means rivals. The attainment of their objects will be of mutual assistance to one another. The aerial navigator will want to know all about the currents and the conditions of the air, while the meteorologist will derive the utmost benefit from the ability to visit any parts of the atmosphere. There are three means now at the service of man by which he may ascend into these desirable regions, or may send up self-recording instruments to probe the mysteries of the skies—viz., balloons, kites and flying machines. Although at the time of its invention the balloon was hailed with acclamation as promising the conquest of the air to man, yet it is now realised that this cumbrous and delicate apparatus is not capable of much practical application. It is, nevertheless, useful (1) as an observatory for scientific investigation; (2) as a means of reconnaisance in war; and (3) as a most agreeable way of spending an hour or two in blissful peace and sublimity. But recently great strides have been made in the improvement of the balloon in the way of providing it with engines and propellers, so that it may be driven to any predetermined goal. Twenty-five years ago the French Government made the first dirigible airship, and now they possess one, if not more, that seems to be a really practical air vessel of war. Count Zeppelin, in Germany, has also produced a machine which in point of size, as well as in speed, has beaten all records. Going to the other extreme, we have small balloons now capable of attaining the greatest heights, carrying self-recording instruments.

Such contrivances have recently ascended to the enormous altitude of 82,000 feet, or nearly 16 miles above the surface of the Earth. Closely connected with this subject of *ballons sondes*, as the French call them, is that of meteorological kites. These also have been much improved in recent years, and instruments lifted by kites retained by steel wires have actually ascended to a height of four miles. Kites of a much larger dimension have also come into use during the last few years. At Aldershot they have been regularly introduced into the service. Men were first lifted by this means in 1895, in which year the lecturer made a number of ascents up to 100 feet high, but improvements have gradually followed until now men have actually gone up to a height of 3000 feet, an elevation practically beyond the reach of rifle bullets, and so high as to render the aeronaut almost invisible.

Major Baden-Powell, in conclusion, referred to a subject which, if it had not hitherto had any very practical results, yet promises to bring about perhaps the most extraordinary changes in the life of man that have resulted from any of the marvellous inventions of the 19th or 20th centuries. The flying machine has come, and it has come to stay. Years ago people argued that it was impossible to lift in the air that which was far heavier than the air. But the advocates of the cause pointed to the birds, and there was no gainsaying that the thing was possible. Then the pessimists cried that it would not be possible to balance the apparatus without the intelligence of the bird, but models were made, finally so good as to fly for three-quarters of a mile. Then men took to gliding on wings and sailing on the wind. Huge machines were constructed with very light engines, and finally, during the last two or three years, not only have men been successfully raised off the ground, but have been able to sustain themselves in the air for half-an-hour at a time. Very little more now remains to be done before we can say that man has veritably conquered the air.

The lecture was illustrated by lantern slides and models.

The following gentlemen were elected Fellows of the Society :— Major B. F. S. Baden-Powell, Señor D. Bebianno, Mr. R. T. G. Cross, Mr. B. J. Donnellan, Mr. G. A. Green, Mr. H. W. Hipwell, Major J. Bruce Kingsmill, Mr. E. L. Mansergh, M.Inst.C.E., Mr. W. L. Mansergh, Assoc. M.Inst.C.E., and Pandit G. M. Vidyabhusan.

Correspondence.

To the Editor of Symons's Meteorological Magazine.

SUNSHINE RECORDERS.

I HAVE read with much interest Mr. Edward Kitto's remarks on sunshine recorders on page 13 of the February Magazine.

With reference to the "objection to the Jordan recorder" alluded to, perhaps I may be allowed a word of explanation, as it seems to

me that any "want of uniformity in the sensitiveness of the paper employed" is not so important a matter as would at first appear, seeing that the only purpose of the instrument is to record the duration of bright sunshine, and not the varying intensity of the sun's rays. In the latter case, a perfect uniformity of sensitiveness would necessarily be all-important.

However sensitive the paper may be, the construction of the instrument precludes the possibility of its registering too much sunshine, for, unless the sun's rays are bright enough to cast a distinct image of the aperture through which they shine on the surface of the sensitized chart, there will be no impression or trace produced. On the other hand, if the photographic chart is sufficiently sensitive to register the image, however faint it is, a trace of the bright sunshine will be secured, and the purpose of the instrument would seem to be attained.

An excess of the sensitiveness will merely exhibit a more deeply coloured trace, without in any way augmenting its apparent duration.

JAMES B. JORDAN.

"*Hayfield*," *Hythe, Kent, March 5th, 1907.*

RAPID FORMATION OF FOG AND GLOOM.

DURING the afternoon of February 28th, at 2.45 p.m., I was coming across Epsom Downs; it had been, and was then, a brilliantly fine and warm day, with continuous sunshine and a cloudless blue sky. An exceptional degree of visibility also prevailed—the tower on the top of Leith Hill standing out with marked clearness. At 3 p.m., when I reached the highest ridge of the Downs (about 470 feet), which commands a view in all directions, there was no apparent change in the conditions, save for a well-defined fog-bank which appeared to extend from N. to N.E., and upwards towards the zenith. A few seconds' observation showed that this bank was approaching very rapidly, and extending laterally. It reached the zenith at 3.2 p.m., and by 3.5 p.m. the landscape had been entirely blotted out, objects 10 feet distant being quite invisible; the bright sunshine had given place to a sun of a vivid crimson hue. Very well-marked fog-billows were visible; they moved with a wave-like motion from N.E. to S.W., at a height of about six feet, light grey in colour and very damp. They were accompanied by a current of cold air. Overhead there was a thick gloom of a brownish hue. A very appreciable cooling of the atmosphere took place, with a great accession of moisture. The wind at 3 p.m. was S.E., force 1, veering at 3–5 p.m. through E. to E.N.E., force 2. The retreat of the phenomenon was very nearly as rapid as its approach; dense fog and gloom prevailed at 3.40 p.m., and at 3.45 p.m. this had given place to practically the same conditions as at 3 p.m. The outline of the fog-bank was again visible in a S. to S.W. direction.

The phenomenon appears to have been confined only to the high ground, as at this station (160 feet) nothing more than the passage of a high fog was noticed at 3 p.m.; this was of short duration, and was accompanied by a temporary and very slight obscuration of sunshine. The thermograph trace shows a rapid drop in temperature of 8° in a few minutes at 3 p.m., 53° to 45°, and a recovery to 48° at 3.15 p.m.

SPENCER C. RUSSELL, F.R.Met.Soc.

Epsom, March 2nd, 1907.

PROTRACTED DROUGHT IN MID-WESSEX.

MARCH, 1907, has been in these parts the driest of four consecutive dry months.

I gather from about thirty returns of rainfall over the region which lies between Shaftesbury and Langport, E. and W., and Shepton Mallet and Beaminster, N. and S., that the rainfall for the first quarter of 1907 is only about 40 per cent. of the average. At many of our stations the whole fall of the three months is less than half of the fall in January, 1906. Not one of the stations reports any other year so dry in its first quarter, and those years, viz., 1898 and 1902, which came nearest to this, though *longo intervallo*, were preceded by *very* wet Decembers; whereas last December was the driest but one for probably 14 years.

At North Cadbury the four months just ended gave a total of 4·40 in., as against an average of 11·11 in. for the same months in the previous ten winters, and a previous lowest, viz., in 1904-5, of 8·56 in.

The warmth of the days, and the sunniness of March, were quite unusual; and on comparing my figures now taken here with those recorded by me at Patras, on the shore of the west coast of Greece, in lat. 38° N., in March, 1874, I find a result so extraordinary that it should be put on record:—

	North Cadbury. March, 1907.	Patras, Greece. March, 1874.	1873.
Highest Maximum in Shade ...	71°·0	61°·1	82°·0
Average ,, ,, ,, ...	55·9	52·8	65·7
Lowest ,, ,, ,, ...	45·0	40·0	60·2

That March in Greece was truly of unprecedented severity, but it, too, was fairly dry and sunny, and I should not have expected the warmest March in England so far to have surpassed it in day warmth.

March, 1873, at Patras was as unusually hot, so I add the figures for that year also (vide *Quarterly Journal* of the Royal Meteorological Society for July, 1875, and July, 1877).

H. A. BOYS, F.R.Met.S.

North Cadbury Rectory, April 4th, 1907.

JAPANESE METEOROLOGICAL OBSERVATIONS IN CHINA AND KOREA.

By L. C. W. Bonacina.

During 1904 and 1905 an extensive system of meteorological observations in China and Korea was established by the Japanese Government, and the results have appeared in a number of pamphlets published by the Central Meteorological Observatory at Tokio.

The contents of these pamphlets, which include an English translation of the Japanese text, consist of masses of tables relating to the various meteorological elements upon which the observations were made at ten stations in China, five in Korea, and one in Yezo. The instruments and method of observation accord with those in use at all meteorological stations in Japan, and the time adopted is the Central Standard, or the mean time of the meridian of 135° E. The barometric and vapour-tension readings as well as the rainfall measurements are given in millimetres, the velocities of the wind are expressed in metres per second, and the degrees of temperature are on the Centigrade scale. The record for 1904 is very fragmentary, but that for 1905 is much better, and is complete for nine out of the sixteen stations.

The Table which follows gives a few interesting figures as obtained from the nine complete records in 1905. It will be noticed that the range of temperature between the absolute extremes for the year was in every case very large, which accords well with what we already know concerning the severity of the seasons in China. That a temperature of 21°·9 F. should have occurred at Hangchow in latitude 30° N. and on the Pacific sea-board, certainly calls for remark. At Fusan, in Korea, the extremes were of the same order that occurs in the inland parts of England during an average year, viz., 90° F. and 15° F. The number of thunderstorm days at the several places was on the whole considerably greater than is usually experienced in England, but the number of snowy days, or days with snow, was about the same as occurs scattered through the late autumn, winter and spring in an average year at places in the lower-lying parts of England, viz., from ten to thirty. The high rainfall at Hangchow and Nankin should be noted, for, as these places are situated in the plain of Western China, it is probably associated with the low latitude of the places and their proximity to the Pacific.

It is sincerely to be hoped that the system of observations here discussed will prove to be the commencement of a long and valuable series which will enable a comparison to be instituted between the variability of the seasons from year to year in Eastern Asia with the variability in Western Europe, where it is so very pronounced a feature of the climate.

Summary of Meteorological Observations in Korea and China, 1905.

STATION.	Latitude N.	Longtitude E.	Temperature, F. abs.max.; abs.min.	Total Rainfall in inches.	No. of days with Thunder-storms.	No. of days with Snow.
In KOREA:—						
Chemulpo	37 29	126 37	90·7 ; 8·4	54·72	16	21
Yongampo.....	39 56	124 22	88·0 ; 1·4	45·68	12	13
Wonsan.....	39 9	127 26	94·8 ; 2·1	73·33	7	27
Fusan.....	35 6	129 3	89·8 ; 15·0	80·60	19	5
In CHINA:—						
Nanking.....	32 5	118 49	100·4 ; 21·2	49·77	27	16
Hangchow.....	30 11	120 12	103·3 ; 21·9	75·64	37	18
Yinkow	40 40	122 14	90·9 ; -5·8	24·88	17	17
Tiensin	39 10	117 10	104·7 ; 9·3	19·74	25	6
Tairen.....	38 56	121 36	90·0 ; 3·0	21·55	18	15

REVIEWS.

Climatology of the United States. By ALFRED JUDSON HENRY, Professor of Meteorology. Prepared under direction of WILLIS L. MOORE, Chief U.S. Weather Bureau. Washington, 1906. Size $11\frac{1}{2} \times 9\frac{1}{2}$. Pp. 1012. Price $10.

THIS massive volume deals with the climatology of the United States, on the basis of observations mainly made between 1870 and 1903, including the whole period of activity of the national meteorological organization under the Signal Service and the Weather Bureau up to date.

The first chapter deals with the broad features of the climate of the United States in 112 pages, supplemented by a large number of maps illustrating normal and extreme distributions of the climatic elements, and also various typical instances of weather. Then follows a section on the climatology of each of the following regions: New England and Middle Atlantic States, South Atlantic and East Gulf States, the West Gulf and southern Rocky Mountain slope, the North Central States, the Rocky Mountain and Plateau region, and the Pacific slope. After a brief introduction, the stations in each state are dealt with consecutively, a page being devoted to each containing the means and extremes of monthly, seasonal and annual temperature and precipitation for the period during which the observations extended. In some cases humidity, wind-direction and sunshine are added. The actual figures for individual months and years are not given, and so far as we have read we have not observed any attempt to show the relation of the means of short periods to long averages or normal values.

Die täglichle Gang der Temperatur in der äusseren Tropenzonen. A. Das Amerikanische und Afrikanische Tropengebiet. [The daily march of temperature in the outer tropical zones. A. The American and African tropical districts.] Von JULIUS HANN. Wein, 1907. Size $12\frac{1}{2} \times 9\frac{1}{2}$. Pp. 88.

DR. HANN had previously dealt with the conditions of daily temperature in the equatorial part of the tropical zone—to 15° N. and S.—and he here extends the "laborious and thankless labour" of compiling the scattered and unequal data for the outer portions of the zone as far as the northern and southern tropics. The collection of all available data which is contained in this memoir must prove of the utmost utility to the student of the wider problems of world meteorology, all the tables being arranged on the same plan and reduced in every instance to the centigrade scale.

Grundzüge einer Theorie der synoptischen Luftdruckveränderungen [Basis of a theory of synoptical pressure changes]. Von DR. FELIX M. EXNER. Wien, 1906. Size $10 \times 6\frac{1}{2}$. Pp. 76.

A MATHEMATICAL discussion of the movements of isobaric forms, based largely upon the work of the U.S. Weather Bureau.

METEOROLOGICAL NEWS AND NOTES.

DR. SHAW'S COURSE OF LECTURES on Dynamical Meteorology at University College, Gower Street, will be resumed on Monday, 29th April, at 5 p.m., and continued on Fridays and Mondays until May 17th, when the last lecture of the course will be delivered.

"BALLOONING AND AERONAUTICS" is the title of a new illustrated monthly magazine, published at one shilling net, by Messrs. Guide and Co. It deals in a comprehensive and interesting way with matters which are so far on the borders of meteorology that all experiments to improve aeronautics at present involve knowledge of weather conditions, while in the future perfected methods of movement through the air may be expected to promote the scientific study of the conditions of the upper atmosphere.

CORRECTIONS.—In Mr. Clark's paper on "A relation between Rainfall at York and Solar Cycles," on p. 32 of last month's issue, the last two lines of the third paragraph and the first line of the fourth paragraph should read as follows:—

September were 30·53 in. and 45·19 in; for October 35·62 in. and 49·61 in. Again, for August and October the contrast is true of *each* cycle.

In Mr. Gaw's article on "Atmospheric phenomena during the Chile Earthquake," in the January number (Vol. **41**, p. 226), the word "minutes" in the seventh line from the bottom of p. 227 should be "seconds," and the line should read:—

8 h. 7 m. 30 s. with 20 seconds' duration. The latter shock was the

TEMPERATURE FOR MARCH, 1907.

STATION.	COUNTY	Lat. N.	Long. W. [*E.]	Height above Sea. ft.	TEMPERATURE. Max. °	Max. Date.	Min. °	Min. Date.	No. of Nights at or below 32° Shade.	Grass.
Camden Square	*London*	51 32	0 8	111	68·7	31	24·4	12	9	20
Tenterden	*Kent*	51 4	*0 41	190	69·4	31	25·0	12	9	24
West Dean	*Hampshire*	51 3	1 38	137	66·0	28†	19·0	12	19	22
Hartley Wintney	,,	51 18	0 53	222	69·0	30	21·0	12	19	23
Hitchin	*Hertfordshire*	51 57	0 17	238	70·0	31	22·0	12	13	...
Winslow (Addington)	*Buckinghamshr.*	51 58	0 53	309	69·0	30, 31	22·0	12	16	22
Bury St. Edmunds (Westley)	*Suffolk*	52 15	*0 40	226	70·0	31	25·0	5	16	...
Brundall	*Norfolk*	52 37	*1 26	66	70·0	30	26·8	5	9	22
Winterbourne Steepleton	*Dorset*	50 42	2 31	316	62·8	31	20·0	12	18	19
Torquay (Cary Green)	*Devon*	50 28	3 32	12	59·0	30	30·9	12	2	17
Polapit Tamar [Launceston]	,,	50 40	4 22	315	64·6	28	24·7	5	13	19
Bath	*Somerset*	51 23	2 21	67	67·0	28	24·8	5	16	...
Stroud (Upfield)	*Gloucestershire*	51 44	2 13	226	63·0	30, 31	28·0	11	...	...
Church Stretton (Woolstaston)	*Shropshire*	52 35	2 48	800	64·5	28, 30	18·5	4	22	...
Bromsgrove (Stoke Reformatory)	*Worcestershire*	52 19	2 4	225	65·0	27, 31	20·0	11	19	...
Boston	*Lincolnshire*	52 58	0 1	25	68·0	30	25·0	12	11	...
Worksop (Hodsock Priory)	*Nottinghamshire*	53 22	1 5	56	68·3	31	24·4	12	15	24
Derby (Midland Railway)	*Derbyshire*	52 55	1 28	156	69·0	31	24·0	11	16	...
Bolton (Queen's Park)	*Lancashire*	53 35	2 28	390	66·3	31	28·5	24	5	18
Wetherby (Ribston Hall)	*Yorkshire, W.R.*	53 59	1 24	130	...	...	...	...	...	...
Arncliffe Vicarage	,, ,,	54 8	2 6	732	...	...	...	...	...	...
Hull (Pearson Park)	,, *E.R.*	53 45	0 20	6	69·0	30	28·0	12	10	20
Newcastle (Town Moor)	*Northumberland*	54 59	1 38	201	...	...	...	...	...	...
Borrowdale (Seathwaite)	*Cumberland*	54 30	3 10	423	63·3	26	28·1	12	7	...
Cardiff (Ely)	*Glamorgan*	51 29	3 13	53	...	...	...	...	...	...
Haverfordwest (High Street)	*Pembroke*	51 48	4 58	95	62·1	26	27·2	24	6	16
Aberystwyth (Gogerddan)	*Cardigan*	52 26	4 1	83	70·0	31	23·0	5	...	...
Llandudno	*Carnarvon*	53 20	3 50	72	66·5	29	32·5	12	...	...
Cargen [Dumfries]	*Kirkcudbright*	55 2	3 37	80	62·0	29	25·0	12	8	...
Lilliesleaf (Riddell House)	*Roxburgh*	55 31	2 46	550	...	..	...	...	...	...
Edinburgh (Royal Observy.)	*Midlothian*	55 55	3 11	442	64·0	29	27·7	10	5	10
Colmonell (Clachanton)	*Ayr*	55 8	4 54	140	61·0	29	23·0	13	...	...
Glasgow (Queen's Park)	*Renfrew*	55 53	4 18	144	63·0	29	28·0	8, 9	7	19
Tighnabruaich	*Argyll*	55 55	5 14	50	50·0	27‡	26·0	8	13	13
Mull (Quinish)	,,	56 36	6 13	35	64·0	31	...	...	...	...
Dundee (Eastern Necropolis)	*Forfar* ..	56 28	2 57	199	61·2	27, 28	23·4	12	9	...
Braemar	*Aberdeen*	57 0	3 24	1114	...	...	...	...	...	...
Aberdeen (Cranford)	,,	57 8	2 7	120	64·0	27	16·0	11	13	...
Cawdor (Budgate)	*Nairn*	57 31	3 57	250	...	...	...	...	...	...
Invergarry	*E. Inverness*	57 4	4 47	130?	...	...	...	...	...	...
Loch Torridon (Bendamph)	*W. Ross*	57 32	5 32	20	...	...	...	...	...	...
Dunrobin Castle	*Sutherland*	57 59	3 56	14	59·0	27	25·0	12	9	...
Castletown	*Caithness*	58 35	3 23	100	61·0	27, 29	18·0	11	15	16
Killarney (District Asylum)	*Kerry*	52 4	9 31	178	64·5	28	38·0	22	...	...
Waterford (Brook Lodge)	*Waterford*	52 15	7 7	104	59·0	27	28·0	23	3	...
Broadford (Hurdlestown)	*Clare*	52 48	8 38	167	56·0	27, 29	28·0	6	3	...
Abbey Leix (Blandsfort)	*Queen's County*	52 56	7 17	532	60·0	27	29·0	1, 23	...	10
Dublin (Fitz William Square)	*Dublin*	53 21	6 14	54	64·1	27	31·8	31	1	9
Ballinasloe	*Galway*	53 20	8 15	160	67·5	27, 28	22·0	23	12	...
Clifden (Kylemore House)	,,	53 32	9 52	105	...	...	...	...	...	...
Crossmolina (Enniscoe)	*Mayo*	54 4	9 18	74	...	...	...	...	...	...
Seaforde	*Down*	54 19	5 50	180	57·0	25	30·0	5	5	18
Londonderry (Creggan Res.)	*Londonderry*	54 59	7 19	320	...	...	...	...	...	...
Omagh (Edenfel)	*Tyrone*	54 36	7 18	280	59·0	27	28·0	22	...	...

† and 30, 31, ‡ and 29, 31.

RAINFALL FOR MARCH, 1907.

RAINFALL OF MONTH.							RAINFALL FROM JAN. 1.					
Aver. 1870-99.	1907.	Diff. from Av.	% of Av.	Max. in 24 hours.		No. of Days	Aver. 1870-99.	1907.	Diff. from Aver.	% of Av.	Mean Annual 1870-1899.	STATION.
				in.	Date.							
in.	in.	in.					in.	in.	in.		in.	
1·62	·97	— ·65	60	·23	12	13	5·13	3·05	— 2·08	59	25·16	Camden Square
1·89	·88	—1·01	47	·14	5	12	6·10	3·30	— 2·80	54	28·36	Tenterden
1·79	·54	—1·25	30	·19	16	10	6·74	2·99	— 3·75	44	29·93	West Dean
1·77	1·00	— ·77	56	·19	16	12	6·22	3·16	— 3·06	51	27·10	Hartley Wintney
1·53	·97	— ·56	63	·21	13	12	4·88	3·16	— 1·72	65	24·66	Hitchin
1·62	1·14	— ·48	70	·19	12	13	5·40	3·21	— 2·19	59	26·75	Addington
1·64	1·02	— ·62	62	·31	19	9	4·89	3·84	— 1·05	79	25·39	Westley
1·65	1·39	— ·26	84	·35	9	14	4·81	4·88	+ ·07	101	25·40	Brundall
2·41	1·01	—1·40	42	·26	16	12	9·42	4·89	— 4·53	52	39·00	Winterbourne Stpltn
2·45	·66	—1·79	27	·33	16	7	8·51	3·92	— 4·59	46	35·00	Torquay
2·41	1·41	—1·00	58	·46	16	15	9·12	5·85	— 3·27	64	38·85	Polapit Tamar
1·94	·70	—1·24	36	·17	16	12	6·58	3·19	— 3·39	49	30·75	Bath
1·86	·69	—1·17	37	·12	16†	13	6·45	3·35	— 3·10	52	29·85	Stroud
2·01	1·34	— ·67	67	·21	19	15	7·09	4·75	— 2·34	67	33·04	Woolstaston
1·36	·63	— ·73	46	·15	9	9	4·90	2·10	— 2·80	43	24·50	Bromsgrove
1·36	1·46	+ ·10	107	·45	19	10	4·50	3·38	— 1·12	75	23·30	Boston
1·55	1·38	— ·17	89	·55	19	16	4·87	3·60	— 1·27	74	24·70	Hodsock Priory
1·49	1·38	— ·11	93	·51	19	13	5·10	4·29	— ·81	84	26·18	Derby
2·88	3·87	+ ·99	134	·99	9	16	8·93	8·65	— ·28	97	42·43	Bolton
1·85	1·71	— ·14	92	·44	19	11	5·37	4·81	— ·56	90	26·96	Ribston Hall
5·03	7·25	+2·22	144	1·53	16	16	16·10	16·29	+ ·19	101	60·96	Arncliffe Vic.
1·79	1·23	— ·56	69	·34	19	14	5·45	3·78	— 1·67	69	27·02	Hull
2·10	1·13	— ·97	54	·41	9	13	5·64	2·86	— 2·78	51	27·99	Newcastle
10·51	14·10	+3·59	134	4·25	16	17	36·86	28·80	— 8·06	78	132·68	Seathwaite
2·79	1·71	—1·08	61	·50	15	13	9·77	6·28	— 3·49	64	42·81	Cardiff
3·03	1·53	—1·50	50	·35	16	14	11·86	6·11	— 5·75	52	47·88	Haverfordwest
2·93	2·56	— ·37	87	·55	6	16	9·83	8·52	— 1·31	87	45·41	Gogerddan
1·97	1·93	— ·04	98	·55	9	13	6·51	4·90	— 1·61	75	30·98	Llandudno
3.01	4·33	+1·32	144	1·22	16	13	11·17	9·32	— 1·85	83	43·43	Cargen
2·40	...	...	...	...	...	...	7·41	...	...	...	33·04	Riddell House
...	1·83	...	...	·65	16	11	...	3·68	...	...	...	Edinburgh
3·18	3·40	+ ·22	107	·83	16	17	11·37	8·50	— 2·87	75	44·85	Colmonell
2·33	3·94	+1·61	169	1·05	16	16	8·11	8·48	+ ·37	105	35·80	Glasgow
4·36	6·72	+2·36	154	1·05	16	22	14·79	15·46	+ ·67	105	57·90	Tighnabruaich
4·23	5·06	+ ·83	120	·53	4	25	14·58	14·17	— ·41	97	57·53	Quinish
1·92	1·80	— ·12	94	·90	16	13	6·12	3·75	— 2·37	61	28·95	Dundee
2·42	1·72	— ·70	71	...	...	...	8·03	5·69	— 2·34	71	36·07	Braemar
2·43	1·53	— ·90	63	·52	16	16	7·18	5·29	— 1·89	74	33·01	Aberdeen
2·16	2·20	+ ·04	102	·47	7	14	6·16	5 93	— ·23	96	29·37	Cawdor
4·83	6·09	+1·26	126	1·21	14	20	16·35	19·52	+ 3·17	119	56·00	Invergarry
6·38	9·47	+3·09	148	1·80	4, 14	21	21·90	30·88	+ 8·98	141	86·50	Bendamph
2·47	1·99	— ·48	81	·26	17	15	7·48	9·27	+ 1·79	124	31·60	Dunrobin Castle
...	2·50	...	...	·29	14	21	...	9·40	...	...	...	Castletown
4·03	3·07	— ·96	76	1·20	17	21	16·04	7·83	— 8·21	49	58·11	Killarney
2·55	1·09	—1·46	43	·36	16	18	9·91	3·75	— 6·16	38	39·30	Waterford
2·17	2·74	+ ·57	126	·53	15	20	7·34	6·39	— ·95	87	33·47	Hurdlestown
2·38	2·34	— ·04	98	·35	16	19	8·10	5·15	— 2·95	64	35·19	Abbey Leix
1·85	1·93	+ ·08	104	·74	19	19	5·99	3·66	— 2·33	61	27·75	Dublin
2·45	2·93	+ ·48	120	·55	16	24	8·42	(7·53)	— ·89	89	37·04	Ballinasloe
5·67	4·76	— ·91	84	1·70	16	19	19·61	13·05	— 6·56	66	80·23	Kylemore House
3·95	4·84	+ ·89	123	1·22	16	23	12·96	12·07	— ·89	93	50·50	Enniscoe
2·56	3·02	+ ·46	118	·94	16	16	9·16	6·45	— 2·71	70	38·61	Seaforde
3·06	5·24	+2·18	171	1·05	16	24	9·35	12·82	+ 3·47	137	41·20	Londonderry
2·47	4·92	+2·45	199	1·25	16	21	8·30	9·89	+ 1·59	119	37·85	Omagh

† and 19.

SUPPLEMENTARY RAINFALL, MARCH, 1907.

Div.	STATION.	Rain. inches	Div.	STATION.	Rain. inches
II.	Abinger Hall	1·20	XI.	Rhayader, Tyrmynydd	...
,,	Ramsgate, West Cliff Villas	·59	,,	Lake Vyrnwy	3·19
,,	Hailsham	1·07	,,	Llangyhanfal, Plâs Draw	1·61
,,	Crowborough, Uckfield Lodge	1·37	,,	Criccieth, Talarvor	2·17
,,	Osborne, Newbarn Cottage.	·42	,,	Llanberis, Pen-y-pass	...
,,	Emsworth, Redlands	·75	,,	Lligwy	2·41
,,	Alton, Ashdell	1·22	,,	Douglas, Woodville	3·39
,,	Newbury, Welford Park	1·23	XII.	Stoneykirk, Ardwell House	3·41
III.	Harrow Weald, Hill House.	·98	,,	Dalry, The Old Garroch	6·81
,,	Oxford, Magdalen College	·79	,,	Langholm, Drove Road	5·28
,,	Bloxham Grove	·92	,,	Moniaive, Maxwelton House	4·48
,,	Pitsford, Sedgebrook	1·11	XIII.	N. Esk Reservoir [Penicuick]	4·50
,,	Huntingdon, Brampton	1·01	XIV.	Maybole, Knockdon Farm	3·75
,,	Wisbech, Bank House	1·02	XV.	Campbeltown, Witchburn	4·81
IV.	Southend Water Works	·81	,,	Inveraray, Newtown	7·81
,,	Colchester, Lexden	·75	,,	Ballachulish House	8·09
,,	Newport, The Vicarage	·94	,,	Islay, Eallabus	5·34
,,	Rendlesham	·92	XVI.	Dollar Academy	4·22
,,	Swaffham	1·19	,,	Loch Leven Sluice	3·19
,,	Blakeney	1·44	,,	Balquhidder, Stronvar	6·05
V.	Bishops Cannings	·89	,,	Perth, Pitcullen House	1·93
,,	Ashburton, Druid House	1·42	,,	Coupar Angus Station	1·73
,,	Okehampton, Oaklands	1·43	,,	Blair Atholl	2·20
,,	Hartland Abbey	·88	,,	Montrose, Sunnyside Asylum	1·31
,,	Lynmouth, Rock House	1·56	XVII.	Alford, Lynturk Manse	1·24
,,	Probus, Lamellyn	1·00	,,	Keith Station	1·46
,,	Wellington, The Avenue	·74	XVIII.	N. Uist, Lochmaddy	4·24
,,	North Cadbury Rectory	·58	,,	Alvey Manse	2·93
VI.	Clifton, Pembroke Road	1·14	,,	Loch Ness, Drumnadrochit.	2·66
,,	Ross, The Graig	·55	,,	Glencarron Lodge	11·69
,,	Shifnal, Hatton Grange	1·13	,,	Fearn, Lower Pitkerrie	1·15
,,	Cheadle, The Heath House.	1·84	XIX.	Invershin	2·11
,,	Blockley, Upton Wold	1·03	,,	Altnaharra	3·59
,,	Coventry, Kingswood	1·04	,,	Bettyhill	2·20
VII.	Market Overton	1·22	,,	Watten Station	1·46
,,	Market Rasen	1·31	XX.	Dunmanway, The Rectory	2·48
,,	Bawtry, Hesley Hall	·96	,,	Cork	1·13
VIII.	Neston, Hinderton Lodge	1·90	,,	Darrynane Abbey	2·82
,,	Southport, Hesketh Park	2·70	,,	Glenam [Clonmel]	1·59
,,	Chatburn, Middlewood	...	,,	Ballingarry, Gurteen	2·38
,,	Cartmel, Flookburgh	5·16	,,	Miltown Malbay	3·34
IX.	Langsett Moor, Up. Midhope	3·90	XXI.	Gorey, Courtown House	·83
,,	Scarborough, Scalby	·97	,,	Moynalty, Westland	2·95
,,	Ingleby Greenhow	·70	,,	Athlone, Twyford	2·75
,,	Mickleton	2·24	,,	Mullingar, Belvedere	3·26
X.	Bardon Mill, Beltingham	2·73	XXII.	Woodlawn	3·88
,,	Ewesley, Fallowlees	2·14	,,	Westport, Murrisk Abbey	...
,,	Ilderton, Lilburn Cottage	1·40	,,	Collooney, Markree Obsy.	4·82
,,	Keswick, York Bank	6·06	XXIII.	Enniskillen, Portora	4·43
XI.	Llanfrechfa Grange	2·29	,,	Warrenpoint, Summer Hill.	1·80
,,	Treherbert, Tyn-y-waun	4·84	,,	Banbridge, Milltown	2·87
,,	Carmarthen, The Friary	1·83	,,	Belfast, Springfield	4·89
,,	Castle Malgwyn [Llechryd].	1·35	,,	Bushmills, Dundarave	4·54
,,	Plynlimon	7·20	,,	Stewartstown, The Square	3·84
,,	Tall-y-llyn	1·40	,,	Killybegs	6·61
,,	New Radnor, Ednol	1·90	,,	Horn Head	3·91

METEOROLOGICAL NOTES ON MARCH, 1907.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Temp. for Temperature; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; TS for Thunderstorm; R for Rain; H for Hail; S for Snow.

LONDON, CAMDEN SQUARE.—Remarkably fine, sunny, warm and dry. The last week in particular resembled June rather than March; on each of the last 5 days the shade temp. exceeded 60°, and on the 31st reached 68°·7. Mean temp. 44°·2, or 2°·1 above the average. Duration of sunshine 151·4* hours, and of R 28·0 hours.

CROWBOROUGH.—Brilliant weather throughout, with mean temp. 44°·1 and R ·99 in. below the average of 36 years. On 16 days there was brilliant sunshine all day.

HARTLEY WINTNEY.—A dry month, in which cold winds and slight showers alternated so as to make the conditions seasonable rather than agreeable. From 19th to the end there was fog and frost in the mornings, with cloudless days. Ozone occurred on every day, with a mean of 4·3.

TORQUAY.—Duration of sunshine 201·8* hours, the greatest in March since 1893; 135·4 hours occurred on the last 13 days. Mean temp. 46°·0, or 1°·9 above the average.

CLIFTON.—Dry till 4th, followed by slight R almost daily till 19th, with westerly winds increasing to a gale on 17th and 19th. The remainder was fine, with almost continuous sunshine, high max. temp., but ground frosts at night. R less than half the average.

WORKSOP.—More sunshine than in any of the last 26 years, the max. temp. also being exceeded by 0°·1 only in 1884. The max. temp. was 66°·0 or more on each of the last 5 days. In the previous 31 years this was reached 5 times only in March, and never more than twice in one month.

BOLTON.—Such pleasant climatic conditions had not been experienced for many years. The mean temp. was with little exception above the average throughout, the mean being 42°·1, or 2°·2 above the average. Duration of sunshine 101·4* hours, or 24·3 hours above the average.

SOUTHPORT.—Exceptionally brilliant, and notable for high max. temp., reaching 67°·6 on 31st, the highest since 1884. Mean temp. 43°·4, or 1°·7 above the average. Duration of sunshine 178* hours, or 53 hours above the average. R ·53 in. above the average; duration, 56·3 hours.

HAVERFORDWEST.—Fine and cold, with small R and sharp frosts. Duration of sunshine 167·6* hours. Gale on 16th; velocity at Goodwick 80 miles per hour.

DOUGLAS.—The first week was fine and mild, succeeded by a fortnight of the worst March weather, stormy, wet and cold. Violent N.W. gale from 16th to 20th. The remainder was unusually fine and calm, with cold nights.

GLASGOW.—The first 4 days were fine but cold; then till 20th cold, stormy and wet, with S showers. From 20th was dry, clear and warm, the max. temp. reaching 50° each day.

COUPAR ANGUS.—An ideal month, particularly in the last week, when the temp. reached 60° on several days. Mean temp. 42°·1, or 3°·0 above the average.

LYNTURK.—The weather of the first half was of the same type as in January and February, S with short open intervals. The last 10 days were very fine.

DRUMNADROCHIT.—R ·35 in., and rain days 1, below the average of 21 years.

CASTLETOWN.—The first few days were fine, but from 5th to 21st rough and cold, with S, keeping back ploughing. The latter part was fine, dry and sunny.

CORK.—R 1·54 in. below the average, making a deficit of 6·24 in. in the past three months. Mean temp. 2°·2 above the average.

DUBLIN.—A showery month with a stormy period from 13th to 20th. From 20th anticyclonic conditions prevailed. Mean temp. 46°·5. Aurora on 21st.

MARKREE.—Much H, sleet and S, with heavy R, in the first half. On 16th 1·47 in. fell in 5 hours between noon and 8 p.m. There was much sunshine.

BELFAST.—Severe weather, except towards the end, and R nearly 2·00 in. above the average.

* Campbell-Stokes.

Climatological Table for the British Empire, October, 1906.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Date.	Absolute. Minimum. Temp.	Date.	Average. Max.	Min.	Dew Point.	Humidity.	Absolute. Max. in Sun.	Max. on Grass.	Total Rain. Depth.	Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
London, Camden Square	71·0	1	35·4	26	61·5	47·6	50·4	88	109·5	34·4	3·15	17	...
Malta	81·7	15	58·1	29	75·0	66·4	62·4	84	...	52·9	8·57	11	3·5
Lagos	85·0	sevl	69·0	14	84·0	73·6	73·1	79	162·0	68·0	6·91	14	6·9
Cape Town	87·5	31	41·9	23	68·3	51·6	50·1	68	...	...	1·29	9	3·3
Durban, Natal ...	84·9	21	53·3	5,6	75·2	60·1	...	...	141·6	...	7·33	19	6·0
Johannesburg	83·5	30	41·2	5	68·9	49·2	45·8	72	152·3	39·2	4·97	11	2·0
Mauritius	83·6	12	61·1	31	78·8	64·9	62·1	73	147·7	52·0	2·01	19	7·4
Calcutta...	91·7	4, 5	67·6	25	87·3	74·2	73·9	81	155·3	62·6	5·50	6	5·3
Bombay...	94·0	23	72·2	30	89·0	76·4	73·1	76	141·9	63·4	·00	0	2·1
Madras	94·6	12	69·2	28	89·7	75·8	73·3	79	147·6	67·7	4·15	9	4·7
Kodaikanal	67·2	10	47·1	31	62·6	51·6	52·5	89	144·0	38·3	7·00	26	7·1
Colombo, Ceylon ...	87·6	15	73·2	28	84·9	75·3	73·6	86	155·2	71·2	15·80	27	7·9
Hongkong	88·9	2	65·7	23	81·0	71·1	62·1	62	141·7	...	1·32	3	4·5
Melbourne	83·8	28	37·8	9	65·7	48·5	47·2	73	149·8	32·4	2·93	12	6·6
Adelaide	95·0	27	42·0	31	71·2	50·6	48·0	63	149·3	37·6	1·66	12	4·4
Coolgardie	98·6	20	39·0	2	78·7	50·9	41·9	43	164·0	36·8	·00	0	2·8
Sydney	92·8	30	46·9	6	73·5	56·5	49·8	59	131·2	41·1	2·06	17	3·9
Wellington	65·2	28	39·6	5	59·9	49·2	45·2	70	132·0	31·0	·71	7	4·5
Auckland	69·0	30	42·0	2	63·2	51·2	47·5	70	130·0	36·0	·97	9	4·9
Jamaica, Negril Point.	88·8	26	69·6	25	86·4	73·3	73·5	79	...	...	9·33	15	...
Trinidad	91·0	23	67·0	21*a*	87·9	70·7	73·7	83	157·0	67·0	6·80	15	...
Grenada	90·4	27	70·6	9	84·4	74·2	78·8	80	155·0	...	14·20	19	4·2
Toronto	73·0	5	26·4	31	56·9	41·3	43·9	81	104·5	20·2	4·49	13	5·9
Winnipeg	72·0	3	5·8	30	52·7	30·8	...	...	...	...	·21	3	6·2
St. John's, N.B. ...	63·6	10	34·4	13	55·8	42·1	...	...	...	...	3·13	11	4·8
Victoria, B.C.	69·8	9	34·0	21	57·4	46·7	...	...	...	...	5·60	18	6·5
Dawson	...	...	...	...	...	...	...	...	...	...	...	...	...

a and 23.

MALTA.—Mean temp. 68°·7, or 0°·5 below the average. Mean hourly velocity of wind 7·4 miles, or 1·5 below average. Mean temp. of sea 72°·8.

Johannesburg.—Rainfall 242 per cent. of average. TSS with H were frequent in the early part of month.

Mauritius.—Mean temp. of air 0°·9 below, dew point 0°·3, humidity 3·1 per cent., and R ·42 in. above, averages. Mean hourly velocity of wind 9·7 miles, or 1·3 below average.

MADRAS.—R less than half the average.

KODAIKANAL.—Bright sunshine 112 hours.

COLOMBO.—Mean temp. of air 79°·2, or 0°·9 below, of dew point 0°·6 above, R 1·10 in. above, averages. Mean hourly velocity of wind 8·0 miles. TSS on 5 days.

HONGKONG.—Mean temp. of air 75°·6. Bright sunshine 233·4 hours. R 3·4 in. below average. Mean hourly velocity of wind 11·5 miles.

Adelaide.—Mean temp. of air 1°·1 below, and R ·10 in. below, averages.

Sydney.—Mean temp. of air 1°·6 above, and R ·88 in. below, averages.

Wellington.—Mean temp. of air 0°·2 above, and R 3·61 in. below, averages.

TRINIDAD.—R ·15 in. above 43 years' average.

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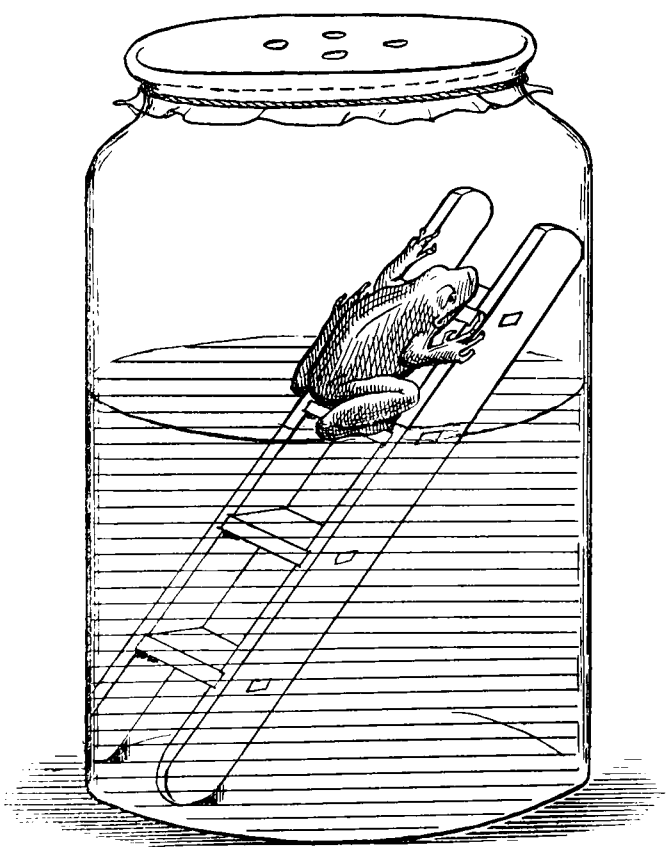
WEATHER WHIMS.—II.

THE FROG'S LADDER.

By Richard Inwards.

Much discredit has been thrown upon the weather indications of animals, but if there is one which has retained the reputation of a prophet, albeit a croaking one, it is the green tree frog (*Hyla Arborea*).



In Germany and Switzerland this animal is commonly provided with a ladder, in a bottle half-filled with water, and he is carefully watched as to his behaviour in uncertain conditions of the atmosphere. Many observers have framed for themselves different rules based on his posture and activity. If he remained on one of the lower steps in the water it was considered a certain indication of bad weather to come; while if he emerged and sat upon the steps it was thought to foreshow fine weather, and the higher the step the finer the weather expected. He also is given to croaking loudly before a storm. Now if we look to the usual life and habits of this frog there seems really some reason to expect him to be at least experienced as regards the climatic conditions. In fine weather he skips about among the branches of the trees, actively catching flies, this goes forward all the summer, as long as there are any flies to catch. At the approach of winter he seeks the water and finds himself a bed in the mud until the following spring calls him out again to resume his fly catching occupation. He adheres to the leaves and stalks by the aid of gelatinous cushions on his toes, though precisely how he manages to release his hold so instantaneously, requires explanation. It is certain that he is a very active creature, and catches flies by rapidly protruding his tongue and drawing them into his mouth, after the manner of the toad.

The frog on the ladder, no doubt, keenly watches the weather conditions, and rises to look out for expected flies when the circumstances seem favourable. On the other hand, when the cold and damp remind him of winter he instinctively retires to bury his sorrows in the imaginary mud, which he seeks at the bottom of his prison.

I am indebted to the kindness of my friend Mr. Stroh for the outline of the frog-ladder, and for some particulars as to the behaviour of the animal.

CLIMATOLOGICAL OBSERVATIONS IN THE BRITISH EMPIRE IN 1905.

WE have hesitated for six months before publishing the accompanying annual summary of our monthly Climatological Table. The reason for this hesitation is not any doubt as to the accuracy or the interest of the figures themselves; but it is solely due to the tendency in the press and on the part of the public to generalize wildly on data which though suggestive are incomplete. Year after year our exposition of the annual summary has been treated by journalists on the keen hunt for sensation, as if it were an exhaustive study of the climatology of the empire. Did the temperature at Adelaide

on one summer day happen to be for a few minutes higher than the maximum recorded for the same year at Bombay, we were met the next week by a paragraph headed

AUSTRALIA HOTTER THAN INDIA,

and a month or two later letters of indignant repudiation reached us from the Antipodes. Did we venture in the summary to mention a few places in other continents where the absolute minimum in winter was as low as in Winnipeg, we had to write apologetic letters in reply to colonial protests against our ignorant leanings towards "the Siberian theory of Canada." The whole thing is laughably absurd. The journalistic eye rarely falls, or lingers should it fall, on the monthly or even the annual tables of plain official figures; but the moment the sense of these figures is expressed in lower case print, the unhappy words are seized upon, and crystallized into a generalization which is sometimes almost an untruth, by the ruthless suppression of explanatory statements. In fact it would not surprise us in the least if in an early batch of press-cuttings we find one founded upon the present article to this effect: —

"AUSTRALIA 69·9 DEGREES HOTTER THAN INDIA.

"It is asserted in a recent number of *Symons's Meteorological Magazine* that Australia is hotter than India. A considerable mass of detailed statistics is adduced in favour of this novel theory, from which we gather that the temperature in the former country was 109·7 deg., and in the latter 39·8 deg., in the year 1905."

Deductions quite as curious have been drawn from earlier articles on the Climatological Table. The fact is of course that it is impossible to condense into a journalistic crystal the truth regarding so complicated a series of phenomena as those which make up the climate of a vast area of land lying in every latitude, from within the polar circle to the equator, the more so when only twenty-five widely scattered stations are available for comparison.

It may be pointed out that imperfect as this conspectus of the climate of the empire is when one attempts by means of it to describe the infinite variations it sums up, it has appeared in our pages monthly since March, 1882, a period of more than 25 years without a break, and that no such complete statement of the climate of different parts of the King's dominions is compiled or published anywhere else. We fully appreciate its value, and are proportionately grateful to the staff of the twenty-four observatories whose punctual kindness makes the Table possible. We commend this summary of the twelve monthly tables for 1905 to our readers, with the foregoing apology for the omission of the descriptive article which used formerly to appear on the occasion.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE FOR 1905.

Stations. *Those in Italics are South of the Equator.*	Absolute. Maximum. Temp.	Maximum. Date.	Minimum. Temp.	Minimum. Date.	Average. Max.	Min.	Mean.	Dew Point.	Humidity.	Absolute. Max. in Sun.	Min. on Grass.	Rainfall. Depth.	Days.	Average. Cloud.
	°		°		°	°	°	°	%	°	°	in.		0—10
London	85·3	July 26	21·2	January 16	58·2	43·4	50·8	46·2	83	134·6	17·5	22·97	162	6·4
Malta	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Lagos	93·0	Mar. 9, 13, 14	69·0	Feb. 6, Jun. 13, Oct. 16	86·0	75·0	80·5	73·2	76	146·0	60·0	65·11	122	6·2
Cape Town	98·1	January 16	38·2	August 15	69·9	54·4	62·1	53·4	73	...	...	30·15	102	4·3
Durban, Natal.	90·7	December 18	45·4	June 14	78·1	61·4	69·8	...	...	154·2	...	44·95	153	4·8
Johannesburg	87·8	October 18	28·7	June 12	69·4	49·6	59·5	46·0	69	164·0	12·0	23·05	101	2·9
Mauritius	89·0	November 17	52·3	August 2	80·8	67·4	74·1	66·3	79	156·4	42·7	68·03	207	6·5
Calcutta	106·1	June 16	45·9	February 10	85·9	69·8	77·9	68·6	75	166·2	39·9	69·76	91	5·1
Bombay	94·7	October 8	56·1	January 31	86·0	74·4	80·2	70·4	74	144·5	47·3	33·66	89	3·9
Madras	107·9	May 29	57·4	January 29	91·7	75·3	83·5	71·3	73	152·1	52·8	42·72	85	4·5
Kodaikanal	74·7	May 5	39·8	January 29	65·1	51·1	58·1	48·5	74	149·0	18·5	59·96	164	5·3
Colombo	93·7	March 6	67·2	January 14	87·1	75·9	81·5	73·6	80	157·5	61·5	65·31	168	5·4
Hong-Kong	91·3	July 18	42·8	February 10	76·0	67·9	72·0	65·3	80	148·5	...	70·98	145	7·1
Melbourne	108·5	Jan. 11, 13	32·0	Aug. 2, Sep. 18	66·2	49·0	57·6	46·7	72	165·4	24·5	25·64	129	6·2
Adelaide	109·7	January 12	34·8	August 21	70·2	51·3	60·8	46·9	62	168·4	30·3	22·28	131	4·9
Coolgardie	108·5	January 20	32·4	August 11	76·5	51·1	63·8	45·2	52	178·8	24·2	7·86	58	3·3
Sydney	98·1	November 17	38·6	July ...	69·5	55·4	62·5	51·1	71	134·9	29·3	35·03	216	4·7
Wellington	77·0	February 5	30·5	June 5	60·3	49·2	54·8	46·4	74	139·0	27·0	51·07	175	6·3
Auckland	78·5	January 19	37·0	June 5	63·6	51·9	57·7	50·1	76	143·0	31·0	39·82	173	5·1
Jamaica	91·6	July 15, 19	62·9	January 27	85·9	71·6	78·7	71·9	79	...	..	55·24	112	...
Grenada	89·4	Apr. 1, Aug. 13	68·0	February 1	83·3	73·8	78·6	71·6	77	154·0	...	77·89	244	3·9
Toronto	92·1	July 18	— 8·2	February 4	53·5	36·5	45·0	38·2	78	...	—14·0	31·26	140	5·9
Fredericton	88·7	June 16, Aug. 12	— 33·5	January 15	51·8	28·2	40·0	27·1	57	...	...	32·69	105	5·3
Winnipeg	86·8	July 10	— 39·1	January 10	46·8	25·4	36·1	...	...	...	...	20·36	96	5·0
Victoria, B.C.	84·2	July 8	22·7	February 12	55·7	44·6	50·2	...	...	...	...	22·98	140	5·9
Dawson	85·7	June 24	— 50·5	January 26	33·6	16·8	25·2	...	...	...	...	15·44	79	...

STORMS AND THE SOURCES OF THEIR ENERGY.

By D. T. SMITH, M.D., Louisville, Kentucky.

NOTWITHSTANDING the diligent research of recent years, there still remains a number of questions unsettled relating to the origin and working of cyclones.

Since the heated air arising every day from islands that experience a sea-breeze must take the form of a cyclone, and since a large proportion of cyclones is known to originate in regions of the ocean where islands abound, it is worth while to inquire whether or not the origin of most, if not all, cyclones can be traced to the gyrating masses of air that rise daily from tropical islands. To this question time and observation must bring the answer. The full discovery of the source of the energy of cyclones must, however, continue to depend largely on inference and reasoning. The energy released in the form of heat by condensing vapour is no longer considered by the best thinkers at all adequate to the production of the tremendous dynamic results witnessed in cyclonic movement.

In addition to the energy that may be derived from the classic source of condensation of moisture, there appear at least two other sources of energy deserving of consideration. One of these is the momentum with which the trade winds rise as they recurve along the borders of the doldrums to become the anti-trades, and later the prevailing easterlies of temperate zones, and the other the decapitation of cyclones by the prevailing overcurrent.

As long as the cyclone is moving to the westward along the line of the trade winds and the doldrums, the ascending trades must continuously enter into and be incorporated with it, carrying with them the energy of their momentum. But the vast preponderance of the energy of cyclones, both for rotation and progression, would seem to be derived from their decapitation by the prevailing overcurrent.

The principle upon which this may be effected is well exhibited in the well-known machine designed for spraying perfumes, but now largely employed by medical men and painters. This well-known instrument consists of two tubes—a horizontal and an upright one—set at right angles to each other in such a way that air blown through the horizontal tube is projected immediately over the upper extremity of the upright tube. The upright tube extends down into the liquid to be sprayed, and when air is blown through the horizontal tube the liquid rises up and is driven onward as spray. This rising of the liquid indicates that the air has been removed from the end of the upright tube faster than it can descend, and that a partial vacuum has been produced at that point.

A cyclone may be regarded as a mountain of atmosphere lifted up to a certain degree by the momentum of the inrush of air at its base, and to this extent it is constituted a "low."

But the top of this mountain is continuously torn off and carried

away forward by the upper or anti-trades, if it is near the tropics, and by the constant easterly overcurrent if it is in the temperate zones. The decapitated mountain, already hollowed out at its base as it is, as regards its gravity, by the momentum of the upward moving core, is thus constituted doubly a "low," into which the air around is constantly pressed.

It is obvious that if the horizontal trajectory of the prevailing overcurrent were equal to the rate of descent of the air above the line of decapitation, the barometric pressure at the Earth's surface over such area would be that due to the weight of the air below that level, or probably about sixteen inches of mercury. But it is rare that the depression in the centre of a cyclone amounts to as much as one inch of mercury, and this ought easily to be effected by the overcurrent moving at the rate of 200 or more miles an hour.

The energy imparted to the cyclone by this continuous decapitation may also be invoked to explain its progression. Since the speed of successive strata of the overcurrent is progressive from below upward, the decapitation of the cyclone must be accompanied by a dragging action that causes the upper part of its mass to lean forward in the direction of advance. This leaning gives to the mass of atmosphere entering the cyclone form in front, an advantage over that coming into it from the rear. That is to say, even if it were stationary, a mass of air starting from the Earth's surface in front of it, would reach a given point on its body in less time than a like mass starting from a place equally removed in the rear could reach a corresponding point; and still more must this be the case when the cyclone is advancing.

This must result in re-forming the centre continuously in advance; and since the centre of gravity thus continuously advances, the whirling cyclone must also advance in order that its axis of rotation may continue coincident with its centre of gravity.

The uniform occurrence of anticyclones on the north-western quadrant of cyclones would seem to indicate a causal relation between the two, and suggests an enquiry as to whether the pursuing anticyclone does not derive its energy from the cyclone.

The rotation of the cyclone in temperate regions carries the mass constituting its poleward rim full against the prevailing overcurrent, and this must have the effect of damming back or heaping up the air on its poleward side. To the extent to which this might happen, and the extent to which the air might be drawn into the narrowing meridians to the north, there would be produced a "high" or anticyclone.

It is also a question whether the increased radiation of heat from a clear atmosphere may not also be a source of energy. The contraction of an anticyclonic mass, due to loss of temperature by radiation, would result in a descent with a momentum corresponding to the average descent of its particles, and this must to an equal extent affect the barometer.

The breeze blowing out from the shadow of an eclipse may be largely, if not wholly, due to such a cause. The air round the area of the shadow could hardly be supposed to flow into the depression due to the contraction in the short time available rapidly enough to be the cause of the outflow.

The momentum of the air descending in a cyclone, and reacting as it is deflected at the Earth's surface, would also seem to some extent to increase the barometric pressure.

In the case of tornadoes also, the energy may be due to the beheading effect of transverse currents derived from cyclones, and it may be occasionally from anticyclones. Where tornadoes spring from cyclones rising masses of air with their energy might become incorporated with them, but this could not well occur in the case of such as grow out of anticyclones.

THE RAINFALL OF APRIL, 1907.

THE remarkable dryness which prevailed in most parts of the country during January, February and March, has been in some measure redressed by the heavy rainfall of the south of England in April.

Our Tables show that the wettest part of the country in relation to the average was the centre of the south of England from the river Thames southward, though not reaching to the coast. Over most of the counties which have the Thames as their northern boundary and westward into Wiltshire more than twice the normal rainfall for April fell. The Rev. H. A. Boys, writing from North Cadbury before the end of the month, remarked, "the first week of April was wetter than February, the second week was wetter than January, the third week was wetter than March, and the three first weeks of April had an inch more rain than the first quarter of the year." Throughout the greater part of the south of England April had more rain than the three preceding months.

A broad belt of the north of England from North Wales to the North Riding of Yorkshire had less than the average rainfall, in some parts not two-thirds of the average, and a similar dry belt crossed Scotland from Cantyre to Aberdeen. To our deep regret the observers, on whose enthusiastic interest we have relied for many years for observations at Colmonell in the south-west and at Riddell House in the south-east of Scotland, have been removed by death, and our summary of the month is rendered incomplete.

In considering the four months of the current year, we find that the only part of England in which the rainfall has appreciably exceeded the average is in Norfolk and the north of Suffolk. In Scotland the western half of the country, and in Ireland the extreme north, have also had more than the normal rainfall. The driest parts of the British Isles for the four months have been three narrow strips on the coast, in each of which less than 75 per cent. of

the average rainfall was recorded. These were (1) the east coast of Scotland and England from Aberdeen to Hull, (2) the western promontories of North Wales, South Wales, and probably Cornwall, and (3) the south coast of Ireland.

ROYAL METEOROLOGICAL SOCIETY.

THE usual monthly meeting of this Society was held on Wednesday evening, April 17th, at the Institution of Civil Engineers, Great George Street, Westminster, Dr. H. R. Mill, President, in the chair.

A paper by Mr. R. L. Holmes, on the "Phenomenal Rainfall in Suva, Fiji, August 8th, 1906," was read by the Secretary in the absence of the author. This was an account of a very remarkable fall of rain which occurred during a thunderstorm at Suva, the capital of Fiji, on the night of August 8th. Unfortunately the exact amount had to be, in part, estimated, owing to the observer failing to measure the fall at intervals during the night. Very little rain fell before sunset, but from 6 p.m. it continued a ceaseless downpour until sunrise the next day. At 10 p.m. the gauge was found overflowing, with 12·50 in. of rain in it. Four hours later, at 2 a.m., on the 9th, the gauge was again overflowing, and at 6 a.m. it was overflowing once more; that is three times in 12 hours. Very little rain fell after 6 a.m. These measurements show a fall of over 37 inches, without taking into account the overflowings, which are an unknown quantity. As the gauge was 25 feet above the ground, Mr. Holmes is of opinion that the rainfall should be increased by about 11 per cent., and he calculates that the total fall must have been fully 41 inches in about 13 hours, which he thinks surpasses anything that had been recorded in any other part of the world in so short a space of time.

An interesting discussion followed the reading of this paper. Mr. Bayard and Captain Hepworth thought it was a pity that Mr. Holmes had not told them more about the rain gauge, and also about the construction of the roof.

Mr. Bentley said that the paper once more illustrated the necessity for the larger and adequate capacity of rain gauges, and more especially in tropical countries.

Mr. Bryant said that they found at the Royal Observatory, Greenwich, that a rainfall on the roof showed a deficiency compared with a rainfall near the ground, varying from 100 per cent. to nothing, or even less, according to the rate of fall and other conditions.

Mr. Marriott said that he would like to have known something of the atmospheric conditions prevailing at the time. If an isobaric chart had been prepared, they would probably have had some information as to the conditions under which the rain fell. The question of the percentage to be added for the rain gauge being 25 feet above the ground would depend upon the character of the wind at the time.

The President said that the amount of rain collected in high and low gauges varied extremely under different circumstances. In very heavy rain there was less difference in the catch of high and low gauges than in light rain, and in heavy rain, in still weather, actually more rain had sometimes been caught at a great elevation than on the ground. The total amount of wind in the twenty-four hours during which the remarkable fall occurred, was 96 miles, averaging only 4 miles per hour. This was very little, and one would expect that the amount of rain falling at 25 feet above the ground would be very nearly the same as at one foot, so that the 11 per cent. addition was probably unnecessary, or at least it was too great.

A paper by Mr. R. Strachan on the "Temperature around the British Islands in relation to the Gulf Stream," was read by the Secretary. This was based on observations made in the year 1906, which have been published by the Meteorological Office. Around the British coasts the temperature of the air was lowest in February, and highest in August; the temperature of the sea corresponded to these epochs with slight interruptions, having been lowest in January for the west and central, in March for the south, and highest in September for the north, and in July for the east, positions. The water in the Strait of Florida was about 30° warmer than the sea at the north of Scotland.

Captain Hepworth, Dr. Dickson, Mr. Matthews, Dr. Theodore Williams, and the President, took part in the discussion, and Mr. Strachan replied.

Mr. L. C. W. Bonacina also read a paper on "Weather regarded as a function of Climate," in which he dealt with the philosophy of the science.

Dr. Shaw, Mr. Strachan, Mr. J. E. Clark, Mr. Bryant, and the President, said a few words on the subject of the paper, and Mr. Bonacina replied.

The following gentlemen were elected Fellows of the Society :— Mr. C. A. O. Buyzer, Mr. D. W. Freshfield, Mr. A. P. Harcourt, Mr. J. E. H. Hill, B.Sc., Mr. W. C. Lane, Capt. C. W. D. Lynch, Capt. S. C. Peacock, Mr. S. M. Shafi, Mr. J. Turner, Mr. T. Tyrwhitt, and Mr. P. D. Warren, Assoc.Inst.C.E.

Correspondence.

To the Editor of Symons's Meteorological Magazine.

THE PAST WINTER IN AUSTRIA.

I NOTICE in the last issue of your Magazine that you have experienced remarkably fine weather during the month of March. With us the weather was abominably cold and wet, with much snow in the

mountains. In the northern Alps the people do not remember a winter with such quantities of snow as that which is just past. Avalanches have wrought havoc, and are still of frequent occurrence. All communications by the Arlberg route, both by road and rail, were completely interrupted for more than a fortnight. Even yet the weather continues cool and rainy.

J. HANN.

Wien, 20th April, 1907.

WHAT IS THE MAXIMUM TEMPERATURE OF A DAY?

In the discussion of the records of a Callendar electrical temperature recorder in the Transvaal, there occasionally arises some uncertainty as to the meaning of the term "maximum temperature of the day." The normal daily temperature record resembles a simple sine curve with a definite maximum at about 3 p.m., and a well-marked minimum about 5 a.m. These conditions allow of no ambiguity as to the meaning of the term "maximum temperature," as this temperature is represented by the peak of the curve. It also satisfies the mathematical definition of a maximum value, in that it is greater than all temperatures in the immediate neighbourhood of it on either side. But occasionally there are days on which the whole of the High Veldt is enveloped in a thick wet mist, through which the sun does not penetrate during the whole time it is above the horizon. On such days the temperature may fall continuously from midnight, and reach its lowest point during the afternoon, and then slowly rise again during the night. Hence the temperature record approximates to a smooth curve which is wholly concave upwards. Considering temperature as a single-valued continuous function of time, such a curve possesses no maximum, and hence, strictly speaking, there is no maximum temperature on that particular day. However, although not possessing a maximum value, a continuous function must possess a greatest and least value, but to specify these, definite limits must be given to the range of the function. At the majority of the stations in the Transvaal, thermometric observations are taken only once a day, viz., at 9 a.m., and the reading of the maximum thermometer, as then read, is entered to the previous day. But when a bright day follows a damp misty day, the temperature of the air at 9 a.m. is frequently several degrees higher than the highest temperature of the previous day. Hence the reading of the maximum thermometer at that time is not a correct representation of the conditions of the previous day. This being so, would it not be advisable in determining the mean maximum temperature of a station for a month or a year, to leave out all those readings of the maximum thermometer which were not greater than the readings of the dry bulb thermometer at 9 a.m., and similarly all readings of the minimum thermometer which were not lower than this reading? This process

should give a more correct value to the means of the maximum and minimum temperatures.

Where the maximum temperatures are obtained from continuous records, and the curve has a crest lying within the limits midnight—midnight, then the temperature corresponding to the crest should be taken as being the maximum temperature of the day, although this might possibly be lower than the temperature at either midnight.

H. E. WOOD.

Transvaal Meteorological Department, Johannesburg, 22nd April, 1907.

[The same difficulty arises not infrequently in the British Isles, especially in winter when the temperature of the air depends less on solar radiation than on the direction of the wind; but we believe that most meteorological observers use the words maximum and minimum as synonymous with highest and lowest, irrespective of the form of the curve of diurnal temperature. The highest temperature has sometimes to be entered to a day on which it did not occur or it would not be entered at all, though obviously when the highest temperature occurs at or before 9 a.m. it has not the normal character of a daily maximum.—ED., *S.M.M.*]

REVIEWS.

Grundzüge einer Theorie der synoptischen Luftdruckveränderungen [Principles of a Theory of Synoptic Weather Changes]. Von DR. FELIX M. EXNER. Aus dem Sitzungsberichten k. Akad. Wiss. Mathem-naturw. Klasse. Bd. CXV. Abt. IIa. Wien, 1906. Size $9\frac{1}{2} \times 6\frac{1}{2}$. Pp. 76.

TAKING advantage of the numerous records of self-registering instruments in different parts of the United States preserved in the Weather Bureau at Washington, Dr. Exner prepared a series of isobaric and isothermal charts for the month of January, 1895, for every four hours, *i.e.*, six of each set of charts for each of 31 consecutive days. By the study of these charts representing atmospheric conditions over a very wide area at short intervals of time, the process by which the consecutive changes resulting in the movement of centres of high and low pressure are effected, is ascertained. The result is subjected to mathematical discussion, and use is made especially of the height at which the variations of pressure from day to day shown in the charts ceases to be felt. The whole work is preliminary to a detailed study of similar conditions in Europe, where on account of the number of agencies at work and the diversity of the hours of observation, the problem is more difficult to attack than in America, where uniformity of observation prevails over an immense area.

Meteorological Observations at Bulawayo. By Rev. E. Goetz, S.J. Bulawayo, 1906. Size $8\frac{1}{2} \times 5\frac{1}{2}$. Pp. 30.

The Meteorological Observatory kept up by Father Goetz at Bulawayo has already been described in these pages (Vol. **40**, 1905, p. 205). We have received the pamphlet named above, which is reprinted from the *Proceedings of the Rhodesian Scientific Association*, and contains a full account of the records tabulated for the years 1897 to 1904. The striking feature about all the figures except rainfall is the remarkable uniformity from year to year. The mean temperatures, for instance, of the seven complete years running 66°·7, 67°·6, 68°·3, 67°·2, 67°·3, 67°·4, 65°·5, so that there is every reason to believe that the average of the seven years, 67°·3, is very close to the normal temperature of the locality. Rainfall varied from 17·58 in. in 1899 to 29·35 in. in 1901, and the alternation of the seasons was so marked that the average duration of the wet season was five months five days, with 21·19 in. of rain falling on 62 days, while the average dry season was six months twenty-five days, with only 1·12 in. falling on 9 days. The rainfall at Hope Fountain, 10 miles S. of Bulawayo, for the years 1898 to 1904 is also quoted.

Cape of Good Hope. Report of the Meteorological Commission for the year ending 31st December, 1904. Cape Town, 1906. Size $13 \times 8\frac{1}{2}$. Pp. 120.

The number of stations for rainfall observation in Cape Town had risen to 523 in the year 1904, but it is pointed out in this report that twice that number of rain gauges uniformly distributed over Cape Colony would barely suffice to enable the average distribution of rainfall over the country to be determined with a reasonable degree of accuracy. It is stated that rain gauges are particularly required in the mountainous districts, where recent investigations have shown that the amount of precipitation may be so enormous as to be almost incredible. We hope in an early number of the Magazine to refer at some length to the remarkable wetness of some of the valleys in the extreme south of Cape Colony.

Meteorological Observations made in Western Australia in 1904. Under the direction of W. Ernest Cooke, M.A., F.R.A.S. Perth, 1906. Size $13 \times 8\frac{1}{2}$. Pp. 144.

The Meteorological Department in Western Australia devoted attention to weather forecasts as well as to the collection of data, and Mr. Cooke notes with very reasonable satisfaction that the percentage of general forecasts for the whole State issued at 4 p.m., and published in the daily papers the following morning, came out as 90 correct, and only 2 wrong, while the special forecasts for Perth and neighbourhood issued at 9 a.m., were correct in 94 per cent. of the cases, and only wrong in one.

Meteorologische Zeitschrift. Hann-Band. Zum vierzigjährigen Redaktionsjubiläum J. Hann's von Freunden und Kollegen gewidmet: redigiert von DR. J. M. PERNTER, Wien, und Dr. G. HELLMANN, Berlin. [The Hann Volume, dedicated by the friends and colleagues of J. Hann, on the occasion of the fortieth anniversary of his editorship of the *Meteorologische Zeitschrift.* Edited by Dr. J. M. Pernter, of Vienna, and Dr. G. Hellmann, of Berlin.] Braunschweig, 1906. Size 12 × 8. Pp. x. + 404.

IT is usual in this country for the colleagues of a scientific man to pay him very handsome tributes of respect and appreciation in the form of obituary notices, not infrequently written in advance, and it is probable that many eminent persons would be agreeably surprised by the warmth of the expressions of their contemporaries' good-will were they privileged to peer into the columbaria of the newspaper offices' "graveyards." On the continent they have a more excellent way, and a favourite method of showing honour to a distinguished worker is for his friends and colleagues to mark some epoch in his life by the presentation of a volume compiled by them on the subject of his studies. That now before us is a typical example, and nothing in the way of a testimonial could be more appropriate than this substantial supplementary volume of the *Meteorologische Zeitschrift*, a publication which, thanks mainly to Dr. Hann's forty years of editorship, is recognised as the leading organ of meteorology in the world. There are, altogether, forty-two memoirs, most of them in German, but some in English or French, representing no less than thirteen different countries. It is impossible to enumerate them all, and we content ourselves with citing those which are given in English, viz. :—

Sir John Eliot.—Brief discussion of the observations of the solar radiation (or black bulb in vacuo) thermometers in India during the period 1892–1903.

W. N. Shaw.—The law of sequence in the yield of wheat for Eastern England.

Cleveland Abbe.—The trade winds and the doldrums.

A. Lawrence Rotch and L. Teisserenc de Bert.—The meteorological conditions above the tropical North Atlantic.

Cold Waves and Frost in the United States. Prepared under direction of Willis L. Moore, Chief U.S. Weather Bureau. By EDWARD B. GARRIOTT, Professor of Meteorology. Washington, 1906. Size 11½ × 9½. Pp. 22 + 328 charts. Price 30 cts.

A SHORT account is given of historical cold periods in the United States from 1717 onwards, and then a series of charts shows the isobars and isotherms of consecutive days in a large number of "cold waves" from 1888, each series extending over the period during which the "cold wave" was moving across the country.

Reduction of Greenwich Meteorological Observations. Part IV. Temperature of the Air as determined from the observations and records of the 15 years 1891 to 1905 made at the Royal Observatory, Greenwich. Now collected and discussed under the direction of SIR W. H. M. CHRISTIE, K.C.B., M.A., F.R.S., Astronomer Royal. Edinburgh, 1906. Size $12\frac{1}{2} \times 9\frac{1}{2}$. Pp. 68, price 3s.

A FRONTISPIECE is given showing the curves of the mean temperature, the mean maximum, and the mean minimum and extreme maximum and extreme minimum of the air for each day of the year on the average of the period 1841 to 1905. A series of tables gives the daily means of temperature for each month so far as regards the daily mean maximum, minimum and range for the period 1891 to 1905, with the highest, lowest and mean values for the 65 years, 1841 to 1905. The memoir is thus a supplement to the volume published in 1895, which dealt with the temperature of the air from 1841 to 1890; but it is more than this, because it makes a comparison between the 50 and 65 years, and gives, amongst many others, a table of the smoothed values of mean temperatures for the 65 years. A large number of other tables represent the data in every conceivable form in which they seem likely to be useful. We propose to give a summary of the constants of temperatures from this memoir in a future number.

Bericht über die Internationale Meteorologische Direktorenkonferenz in Innsbruck, September, 1905. (Report of the International Conference of Directors of Meteorological Institutions at Innsbruck). Wien, 1906. Size $11 \times 7\frac{1}{2}$, pp. 154.

THIS is the official report of the meeting of Directors of Meteorological Institutions which took place in Innsbruck, in 1905, on the initiative of the International Meteorological Committee. It contains a report of the proceedings at the meeting, the reports of various committees on matters relating to meteorology and terrestrial magnetism, and also a series of appendices dealing with many points of great interest, concerning which additional information is required and international co-operation desirable. Want of space alone prevents us from referring in detail to the points brought forward.

Rainfall at Ashburton. Forty Years' Record, by P. F. S. AMERY. (Reprinted from *Trans.* Devonshire Association, 1906). Size $8\frac{1}{2} \times 5\frac{1}{2}$. Pp. 8 + 3 plates.

A DISCUSSION of a valuable rainfall record on the south-eastern slope of Dartmoor, the author apparently not being the observer. Some emphasis is laid upon the 40 years' record yielding a driest year somewhat wetter than that usually assumed as the lowest likely to occur; but without information as to the pattern and exposure of the rain gauge (which is not given) no valid conclusion can be drawn.

Meteorology in Mysore, 1905. Thirteenth Annual Report. Pp. 56.

Report on Rain Registration in Mysore for 1905. Pp. 30. By JOHN COOK, M.A., F.R.S.E. Bangalore, 1906. Size $12 \times 9\frac{1}{2}$.

THE general Report contains a frontispiece showing the large and handsome building of the Mysore Government Central Observatory at Bangalore, and the observations of the year are discussed in considerable detail. The Rainfall volume contains a map of Mysore province showing the average annual rainfall for the 36-years' period, 1870—1905. This map would have gained in clearness if the shading indicating the areas of increasing rainfall had been made of increasing darkness, and not simply depending as they do on lines running at different angles. The map also appears in red instead of blue, the usual livery of rainfall maps. There is no reason why it should not be red, but at the same time the familiar colouring would afford a certain help to the eye in following the distribution.

METEOROLOGICAL NEWS AND NOTES.

DEATH OF DR. BUCHAN.—At the moment of going to press we learn with profound regret of the death of Dr. Alexander Buchan, F.R.S., which occurred at Edinburgh on May 13th. A sketch of Dr. Buchan's career as a meteorologist will be given in an early number.

DR. DOBERCK, Director of the Hong Kong Observatory, is, we are informed by *The Observatory*, about to retire from that position, which he has occupied since the year 1883.

A SELF-REGISTERING SNOW GAUGE is described by Dr. Hellmann in a recent number of the *Meteorologische Zeitschrift* (1906, Heft 8). The principle is that of a balance, like the Casella recording rain gauge. This Chionograph has a funnel surface of 64 square inches, all the snow entering which falls on the pan of a balance with a fixed counterpoise at the end of a curved lever, and the descent of the pan, which is always in equilibrium, as the weight on it increases, actuates a pen working on a drum as in the common aneroidograph. The pen has a range corresponding to 1·38 in. of rain, and then automatically drops to zero and makes a second ascent of the drum. Should more snow than corresponds to 2·76 in. of rain fall (*i.e.*, more than about 2 feet), it is necessary to change the receiving vessel on the plate of the balance.

TEMPERATURE FOR APRIL, 1907.

STATION.	COUNTY.	Lat. N.	Long. W. [*E.]	Height above Sea. ft.	TEMPERATURE. Max. °	Max. Date.	Min. °	Min. Date.	No. of Nights at or below 32° Shade.	Grass.
		° ′	° ′							
Camden Square	*London*	51 32	0 8	111	73·4	24	30·8	19	1	7
Tenterden	*Kent*	51 4	*0 41	190	71·0	24	30·0	19	2	15
West Dean	*Hampshire*	51 3	1 38	137	70·0	24	26·0	20	10	21
Hartley Wintney	,,	51 18	0 53	222	73·0	2,24	29·0	19,20	7	12
Hitchin	*Hertfordshire*	51 57	0 17	238	70·0	1	28·0	19	5	...
Winslow (Addington)	*Buckinghamshr.*	51 58	0 53	309	69·0	1,24	29·0	18	5	13
Bury St. Edmunds (Westley)	*Suffolk*	52 15	*0 40	226	69·0	1,24	27·0	19	4	...
Brundall	*Norfolk*	52 37	*1 26	66	67·4	24	29·4	20	3	11
Winterbourne Steepleton	*Dorset*	50 42	2 31	316	69·0	24	28·5	4	5	11
Torquay (Cary Green)	*Devon*	50 28	3 32	12	69·0	24	35·2	18	0	6
Polapit Tamar [Launceston]	,,	50 40	4 22	315	64·0	1	30·6	5	3	13
Bath	*Somerset*	51 23	2 21	67	67·0	1,24	29·5	20	4	...
Stroud (Upfield)	*Gloucestershire*	51 44	2 13	226	67·0	24	35·0	17	0	...
Church Stretton (Woolstaston)	*Shropshire*	52 35	2 48	800	64·5	1,24	20·0	18	23	...
Bromsgrove (Stoke Reformatory)	*Worcestershire*	52 19	2 4	225	65·0	1	26·0	17	9	...
Boston	*Lincolnshire*	52 58	0 1	25	68·0	1	30·0	18‡	6	...
Worksop (Hodsock Priory)	*Nottinghamshire*	53 22	1 5	56	67·3	1	28·9	18	6	15
Derby (Midland Railway)	*Derbyshire*	52 55	1 28	156	69·0	1	30·0	17	3	...
Bolton (Queen's Park)	*Lancashire*	53 35	2 28	390	63·0	2	28·4	18	1	10
Wetherby (Ribston Hall)	*Yorkshire, W.R.*	53 59	1 24	130	...	...	...	...	...	...
Arncliffe Vicarage	,, ,,	54 8	2 6	732	...	...	...	...	...	...
Hull (Pearson Park)	,, *E.R.*	53 45	0 20	6	66·0	24	28·0	19	2	8
Newcastle (Town Moor)	*Northumberland*	54 59	1 38	201	...	..	...	...	...	...
Borrowdale (Seathwaite)	*Cumberland*	54 30	3 10	423	59·8	2	26·8	18	4	...
Cardiff (Ely)	*Glamorgan*	51 29	3 13	53	...	...	...	...	...	...
Haverfordwest (High Street)	*Pembroke*	51 48	4 58	95	62·0	24	32·2	5	...	5
Aberystwyth (Gogerddan)	*Cardigan*	52 26	4 1	83	65·0	24	26·0	19	...	...
Llandudno	*Carnarvon*	53 20	3 50	72	63·0	2	31·2	18	1	...
Cargen [Dumfries]	*Kirkcudbright*	55 2	3 37	80	64·0	2	26·0	18	6	...
Lilliesleaf (Riddell House)	*Roxburgh*	55 31	2 46	550	...	...	...	...	...	...
Edinburgh (Royal Observy.)	*Midlothian*	55 55	3 11	442	61·8	2	28·4	18	1	8
Colmonell (Clachanton)	*Ayr*	55 8	4 54	140	...	...	...	...	...	...
Glasgow (Queen's Park)	*Renfrew*	55 53	4 18	144	64·0	2	30·0	17	2	16
Tighnabruaich	*Argyll*	55 55	5 14	50	52·0	21	28·0	17	8	8
Mull (Quinish)	,,	56 36	6 13	35	...	..	...	...	...	...
Dundee (Eastern Necropolis)	*Forfar*	56 28	2 57	199	63·4	23	28·0	19	3	...
Braemar	*Aberdeen*	57 0	3 24	1114	...	...	...	...	...	...
Aberdeen (Cranford)	,,	57 8	2 7	120	58·0	1†	25·0	15,18	10	...
Cawdor (Budgate)	*Nairn*	57 31	3 57	250	...	...	...	...	...	...
Invergarry	*E. Inverness*	57 4	4 47	130?	...	...	...	...	...	...
Loch Torridon (Bendamph)	*W. Ross*	57 32	5 32	20	...	...	...	...	...	...
Dunrobin Castle	*Sutherland*	57 59	3 56	14	58·5	23	33·5	17	...	...
Castletown	*Caithness*	58 35	3 23	100	58·0	1	29·0	18	7	7
Killarney (District Asylum)	*Kerry*	52 4	9 31	178	65·0	25	29·0	4	...	...
Waterford (Brook Lodge)	*Waterford*	52 15	7 7	104	63·5	24	29·0	4	4	...
Broadford (Hurdlestown)	*Clare*	52 48	8 38	167	65·0	24	28·0	3	5	...
Abbey Leix (Blandsfort)	*Queen's County*	52 56	7 17	532	63·0	23	...	...	...	13
Dublin (Fitz William Square)	*Dublin*	53 21	6 14	54	67·0	23	33·2	15	0	6
Ballinasloe	*Galway*	53 20	8 15	160	70·0	24	24·0	4,18	12	...
Clifden (Kylemore House)	,,	53 32	9 52	105	...	...	...	...	...	...
Crossmolina (Enniscoe)	*Mayo*	54 4	9 18	74	...	...	...	...	...	...
Seaforde	*Down*	54 19	5 50	180	62·0	23	30·0	17	3	6
Londonderry (Creggan Res.)	*Londonderry*	54 59	7 19	320	...	...	...	...	...	...
Omagh (Edenfel)	*Tyrone*	54 36	7 18	280	57·0	1,23	29·0	17	...	...

† and 21, 22, ‡ and 19, 20, 27, 28.

RAINFALL FOR APRIL, 1907.

RAINFALL OF MONTH.							RAINFALL FROM JAN. 1.					
Aver. 1870-99.	1907.	Diff. from Av.	% of Av.	Max. in 24 hours.		No. of Days	Aver. 1870-99.	1907.	Diff. from Aver.	% of Av.	Mean Annual 1870-1899.	STATION.
				in.	Date.							
in.	in.	in.					in.	in.	in.		in.	
1·69	3·22	+1·53	191	·49	6	18	6·82	6·27	— ·55	92	25·16	Camden Square
1·77	3·16	+1·39	179	·51	26	18	7·87	6·46	— 1·41	82	28·36	Tenterden
1·99	4·38	+2·39	220	·57	29	22	8·73	7·37	— 1·36	84	29·93	West Dean
1·69	4·42	+2·73	262	·54	12	19	7·91	7·58	— ·33	96	27·10	Hartley Wintney
1·62	2·62	+1·00	162	·55	30	15	6·50	5·78	— ·72	89	24·66	Hitchin
1·83	2·66	+ ·83	145	·51	30	19	7·23	5·87	— 1·36	81	26·75	Addington
1·54	2·85	+1·31	185	·68	30	19	6·43	6·69	+ ·26	104	25·39	Westley
1·68	3·21	+1·53	191	·67	30	23	6·49	8·09	+ 1·60	125	25·40	Brundall
2·60	4·89	+2·29	188	1·19	20	19	12·02	9·78	— 2·24	81	39·00	Winterbourne Stpltn
2·45	4·15	+1·70	170	·63	13	19	10·96	8·07	— 2·89	74	35·00	Torquay
2·23	4·37	+2·14	196	·87	2	22	11·35	10·22	— 1·13	90	38·85	Polapit Tamar
2·05	3·57	+1·52	174	·67	12	18	8·63	6·76	— 1·87	78	30·75	Bath
2·05	3·50	+1·45	171	·58	12	19	8·50	6·85	— 1·65	81	29·85	Stroud
2·14	2·93	+ ·79	137	·98	12	15	9·23	7·68	— 1·55	83	33·04	Woolstaston
1·66	2·02	+ ·36	122	·54	12	14	6·56	4·12	— 2·44	63	24·50	Bromsgrove
1·59	1·63	+ ·04	103	·30	4	16	6·09	5·01	— 1·08	82	23·30	Boston
1·69	1·70	+ ·01	101	·37	13, 21	15	6·56	5·30	— 1·26	81	24·70	Hodsock Priory
1·72	1·73	+ ·01	101	·23	13	23	6·82	6·02	— ·80	88	26·18	Derby
2·15	1·87	— ·28	87	·56	6	18	11·08	10·52	— ·56	95	42·43	Bolton
1·98	1·52	— ·46	77	·28	2	15	7·35	6·33	— 1·02	86	26·96	Ribston Hall
3·32	3·64	+ ·32	110	1·12	22	17	19·42	19·93	+ ·51	103	60·96	Arncliffe Vic.
1·72	1·59	— ·13	92	·32	30	16	7·17	5·37	— 1·80	75	27·02	Hull
1·79	2·53	+ ·74	141	·60	3	20	7·43	5·39	— 2·04	73	27·99	Newcastle
6·27	7·16	+ ·89	114	1·91	20	14	43·13	35·96	— 7·17	83	132·68	Seathwaite
2·34	3·78	+1·44	161	·80	12	22	12·11	10·06	— 2·05	83	42·81	Cardiff
2·67	4·36	+1·69	163	·85	20	19	14·53	10·47	— 4·06	72	47·88	Haverfordwest
2·39	2·54	+ ·15	106	·43	3	14	12·22	11·06	— 1·16	91	45·41	Gogerddan
1·82	1·12	— ·70	62	·16	3	15	8·33	6·02	— 2·31	72	30·98	Llandudno
2·30	2·87	+ ·57	125	·79	6	10	13·47	12·19	— 1·28	90	43·43	Cargen
1·96	...	...	...	...	...	...	9·37	..	...	...	33·04	Riddell House
...	1·31	...	...	·36	30	15	...	4·99	...	...	...	Edinburgh
2·25	...	...	...	...	...	...	13·62	...	...	...	44·85	Colmonell
1·77	2·38	+ ·61	135	·55	6, 10	13	9·88	10·86	+ ·98	110	35·80	Glasgow
2·89	2·61	— ·28	90	·55	6	12	17·68	18·07	+ ·39	102	57·90	Tighnabruaich
2·80	3·54	+ ·74	126	·59	3	20	17·38	17·71	+ ·33	102	57·53	Quinish
1·94	1·85	— ·09	95	·45	3	15	8·06	5·60	— 2·46	69	28·95	Dundee
2·18	3·69	+1·51	169	...	...	...	10·21	9·38	— ·83	92	36·07	Braemar
2·22	1·59	— ·63	72	·28	30	17	9·40	6·88	— 2·52	73	33·01	Aberdeen
1·49	1·73	+ ·24	116	·52	30	10	7·65	7·66	+ ·01	100	29·37	Cawdor
2·68	3·17	+ ·49	118	·95	6	7	19·03	22·69	+ 3·66	119	56·00	Invergarry
4·31	5·45	+1·14	127	·75	30	17	26·21	36·33	+10·12	139	86·50	Bendamph
1·81	2·20	+ ·39	122	·37	15	15	9·29	11·47	+ 2·18	123	31·60	Dunrobin Castle
...	2·18	...	...	·40	26	22	...	11·58	...	...	...	Castletown
3·71	3·90	+ ·19	105	·58	7	25	19·75	11·73	— 8·02	59	58·11	Killarney
2·56	3·60	+1·04	141	·56	6	21	12·47	7·35	— 5·12	59	39·30	Waterford
2·17	3·40	+1·23	157	·67	5	19	9·51	9·79	+ ·28	103	33·47	Hurdlestown
2·40	3·38	+ ·98	141	1·02	8	23	10·50	8·53	— 1·97	81	35·19	Abbey Leix
2·00	2·62	+ ·62	131	·38	2	22	7·99	6·28	— 1·71	79	27·75	Dublin
2·32	2·31	— ·01	100	·65	8	20	10·74	9·84	— ·90	92	37·04	Ballinasloe
4·74	6·26	+1·52	132	1·37	7	18	24·35	20·01	— 4·34	82	80·23	Kylemore House
2·90	3·39	+ ·49	117	·52	5, 30	22	15·86	15·46	— ·40	97	50·50	Enniscoe
2·59	2·81	+ ·22	108	·91	4	17	11·75	9·26	— 2·49	79	38·61	Seaforde
2·32	3·76	+1·44	162	·87	28	23	11·67	16·58	+ 4·91	142	41·20	Londonderry
2·25	3·15	+ ·90	140	·40	5	22	10·55	13·04	+ 2·49	124	37·85	Omagh

SUPPLEMENTARY RAINFALL, APRIL, 1907.

Div.	STATION.	Rain. inches	Div.	STATION.	Rain. inches
II.	Abinger Hall	5·19	XI.	Rhayader, Tyrmynydd	...
,,	Ramsgate, West Cliff Villas	2·32	,,	Lake Vyrnwy	3·13
,,	Hailsham	3·76	,,	Llangyhanfal, Plâs Draw	2·19
,,	Crowborough, Uckfield Lodge	3·99	,,	Criccieth, Talarvor	2·07
,,	Osborne, Newbarn Cottage.	...	,,	Llanberis, Pen-y-pass	...
,,	Emsworth, Redlands	4·23	,,	Lligwy	1·44
,,	Alton, Ashdell	4·62	,,	Douglas, Woodville	2·71
,,	Newbury, Welford Park	3·79	XII.	Stoneykirk, Ardwell House	2·55
III.	Harrow Weald, Hill House.	3·57	,,	Dalry, The Old Garroch	4·08
,,	Oxford, Magdalen College..	1·87	,,	Langholm, Drove Road	2·84
,,	Bloxham Grove	2·33	,,	Moniaive, Maxwelton House	2·67
,,	Pitsford, Sedgebrook	2·26	XIII.	N. Esk Reservoir [Penicuick]	2·25
,,	Huntingdon, Brampton	3·05	XIV.	Maybole, Knockdon Farm..	3·27
,,	Wisbech, Bank House	2·47	XV.	Campbeltown, Witchburn	2·81
IV.	Southend Water Works	2·23	,,	Inveraray, Newtown	4·87
,,	Colchester, Lexden	3·12	,,	Ballachulish House	4·39
,,	Newport, The Vicarage	3·23	,,	Islay, Eallabus	3·54
,,	Rendlesham	3·10	XVI.	Dollar Academy	1·60
,,	Swaffham	3·03	,,	Loch Leven Sluice	1·51
,,	Blakeney	2·82	,,	Balquhidder, Stronvar	4·30
V.	Bishops Cannings	4·13	,,	Perth, Pitcullen House	1·66
,,	Ashburton, Druid House	6·36	,,	Coupar Angus Station	1·96
,,	Okehampton, Oaklands	5·88	,,	Blair Atholl	3·31
,,	Hartland Abbey	5·42	,,	Montrose, Sunnyside Asylum	1·57
,,	Lynmouth, Rock House	4·43	XVII.	Alford, Lynturk Manse	2·33
,,	Probus, Lamellyn	4·91	,,	Keith Station	2·21
,,	Wellington, The Avenue	4·93	XVIII.	N. Uist, Lochmaddy	1·54
,,	North Cadbury Rectory	4·52	,,	Alvey Manse	1·67
VI.	Clifton, Pembroke Road	3·95	,,	Loch Ness, Drumnadrochit.	1·51
,,	Ross, The Graig	3·11	,,	Glencarron Lodge	4·70
,,	Shifnal, Hatton Grange	2·11	,,	Fearn, Lower Pitkerrie	·90
,,	Cheadle, The Heath House.	1·39	XIX.	Invershin	2·20
,,	Blockley, Upton Wold	3·01	,,	Altnaharra	2·33
,,	Coventry, Kingswood	1·81	,,	Bettyhill	2·03
VII.	Market Overton	2·68	XX.	Dunmanway, The Rectory..	4·55
,,	Market Rasen	1·76	,,	Cork	2·99
,,	Bawtry, Hesley Hall	1·76	,,	Darrynane Abbey	4·31
VIII.	Neston, Hinderton Lodge	1·01	,,	Glenam [Clonmel]	3·48
,,	Southport, Hesketh Park	1·60	,,	Ballingarry, Gurteen	2·01
,,	Chatburn, Middlewood	1·69	,,	Miltown Malbay	2·89
,,	Cartmel, Flookburgh	2·17	XXI.	Gorey, Courtown House	2·39
IX.	Langsett Moor, Up. Midhope	2·82	,,	Moynalty, Westland	2·49
,,	Scarborough, Scalby	2·02	,,	Athlone, Twyford	2·71
,,	Ingleby Greenhow	3·19	,,	Mullingar, Belvedere	2·01
,,	Mickleton	1·25	XXII.	Woodlawn	2·58
X.	Bardon Mill, Beltingham	2·29	,,	Westport, Murrisk Abbey..	...
,,	Ewesley, Fallowlees	3·44	,,	Collooney, Markree Obsy..	3·12
,,	Ilderton, Lilburn Cottage	3·09	,,	Mohill	2·23
,,	Keswick, York Bank	2·65	XXIII.	Enniskillen, Portora	2·13
XI.	Llanfrechfa Grange	3·57	,,	Warrenpoint, Summer Hill.	2·31
,,	Treherbert, Tyn-y-waun	5·97	,,	Banbridge, Milltown	2·62
,,	Carmarthen, The Friary	3·87	,,	Belfast, Springfield	2·34
,,	Castle Malgwyn [Llechryd].	4·00	,,	Bushmills, Dundarave	2·06
,,	Plynlimon	5·70	,,	Stewartstown, The Square..	2·28
,,	Tall-y-llyn	...	,,	Killybegs	3·95
,,	New Radnor, Ednol	2·89	,,	Horn Head	2·49

METEOROLOGICAL NOTES ON APRIL, 1907.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Temp. for Temperature; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; TS for Thunderstorm; R for Rain; H for Hail; S for Snow.

LONDON, CAMDEN SQUARE.—The brilliant weather of Easter gave way on 3rd to unsettled conditions, which lasted throughout the month, with copious R at frequent intervals. After 2nd the shade temp. reached 60° on three days only, but there were few frosts. Mean temp. 47°·3, or 0°·8 below the average. Duration of sunshine 104·2* hours, and of R 65·6 hours.

CROWBOROUGH.—Cold and wet, with occasional night frosts. R 1·84 in. above the average of 36 years, reducing the deficiency for the year to ·99 in. Mean temp. 46°. On 7th an inch and a half of S fell.

HARTLEY WINTNEY.—Very cold and wet, being the wettest April yet recorded here. In the second week the weather was stormy and unsettled, with slight TSS daily, and during the last week there was a bitter wind, which greatly retarded vegetation. Ozone was recorded daily, with a mean of 5·2.

TORQUAY.—Duration of sunshine 182·3* hours, or 1·7 hours above the average. Mean temp. 47°·7, or 0°·5 below the average. Mean amount of ozone 5·2.

NORTH CADBURY.—By far the wettest April in 11 years, the R being nearly double that of the previous three months. The mean max. temp. was very low, but the min. and number of frosts normal. The heaviest S of the winter. about three inches fell early on 7th.

BOLTON.—The pressure and mean temp. were close to the normal, the latter being 44°·2, or 0°·3 below the average, but the duration of sunshine, 70·4* hours, was remarkably low, 38·5 hours below the average, and the least in April since 1891. The weather throughout was dull and changeable.

SOUTHPORT.—The mean bar. was very low during the first half, but it was otherwise a normal month. Easterly winds generally till the 19th. Mean temp. 45°·7, or 0°·2 below the average. Duration of sunshine 163* hours, or 16 hours below the average. Duration of rainfall 38·3 hours.

HAVERFORDWEST.—A cold month, with large R, which fell mostly at night, Duration of sunshine 156·7* hours. Vegetation backward.

DOUGLAS.—Stormy, with more or less strong polar winds throughout, so that the backward vegetation made little progress in a generally ungenial month. S fell heavily for some hours on 6th.

DUMFRIES.—A cold bleak month, but without low. min. temp. Cold W. winds at the close, accompanied by blizzard like showers, occasioned a serious check on vegetation.

COUPAR ANGUS.—Bleak throughout, with cold N.W. winds. The R was normal, but the mean temp. 43°·0 was 1°·0 below the average.

DRUMNADROCHIT.—R ·35 in., and rain days 2, below the average of 21 years. On the whole it was sunny but with frequent cold winds, and on high land a good deal of S.

DUNMANWAY.—On the whole cold, with heavy showers and sometimes H, but bright sunshine was frequent.

DARRYNANE ABBEY.—Wet and changeable, with some fine warm days, but the last few days were very cold. R 21 per cent. above the average.

DUBLIN.—Cloudy, unsettled and rainy. Distinctly cold but for a warm spell between 22nd and 25th. Mean temp. 47°·2, or 0°·4 below the average. H on 4 days.

OMAGH.—Cold, wet and unsettled, with S on 26th and heavy H showers on 29th. Corn-crakes and swallows were seen on 30th.

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* Campbell-Stokes.

Climatological Table for the British Empire, November, 1906.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Date.	Absolute. Minimum. Temp.	Date.	Average. Max.	Min.	Dew Point.	Humidity.	Absolute. Max. in Sun.	Max. on Grass.	Total Rain. Depth.	Days.	Aver. Cloud.
	°		°		°	°	°	(0-100)	°	°	inches		
London, Camden Square	60·1	22	29·7	19	51·9	41·6	43·9	90	80·2	28·0	4·20	17	...
Malta	...	...	...	...	...	...	...	...	...	...	...	...	...
Lagos	89·0	7*a*	72·0	26	86·6	75·6	74·7	76	160·0	70·0	1·37	9	5·7
Cape Town	86·5	1	50·4	17	74·3	57·4	52·3	63	...	...	·55	5	3·7
Durban, Natal ...	86·2	7	55·1	19	78·2	64·1	...	...	146·5	...	3·19	19	5·8
Johannesburg	82·1	2	42·9	16	70·9	51·5	50·1	70	160·8	41·5	5·34	12	4·7
Mauritius	88·1	30	61·0	7	82·4	65·1	61·6	67	148·1	54·4	·62	11	5·7
Calcutta...	86·4	3	59·5	26	82·7	65·4	64·8	74	148·8	54·0	·35	2	1·9
Bombay...	91·8	23	72·1	30	89·4	75·7	69·9	68	136·5	60·9	·00	0	1·4
Madras	90·9	6	68·7	27	85·7	72·5	71·9	83	143·5	65·6	6·47	15	5·9
Kodaikanal	65·5	17	45·8	22	60·8	49·5	50·5	88	126·8	37·2	10·93	20	7·4
Colombo, Ceylon ...	88·4	23	71·8	6	85·3	73·9	72·6	85	152·8	68·0	14·65	19	6·9
Hongkong	82·9	2	55·3	20	73·4	62·4	54·0	62	137·5	...	·18	4	4·9
Melbourne	87·3	17	40·6	5	67·0	49·5	47·7	72	148·2	36·2	2·47	13	7·8
Adelaide	90·4	8	44·3	6	73·2	52·8	48·2	57	148·0	41·1	2·45	11	6·4
Coolgardie	98·0	24	42·9	18	79·7	53·1	45·4	47	166·9	39·2	·99	6	3·4
Sydney	92·0	22	48·2	6	73·8	57·5	51·4	61	133·2	36·0	4·12	19	4·8
Wellington	67·5	23	41·0	16	61·4	48·9	47·2	73	143·0	34·0	4·69	14	6·2
Auckland	72·0	25	49·0	10	66·0	53·7	51·2	73	139·0	42·0	5·62	12	5·2
Jamaica, Negril Point.	89·1	16	68·0	26	85·7	72·8	72·3	84	...	...	2·77	6	...
Trinidad	90·0	sev1	78·0	9	87·6	71·1	73·5	83	162·0	66·0	5·00	12	...
Grenada	88·0	4, 5	72·0	25*b*	84·4	74·7	72·3	78	152·0	...	9·89	23	4·3
Toronto	58·6	18	21·6	14	...	...	31·4	79	...	...	1·68	13	7·0
Winnipeg	47·3	7	-10·0	20	...	...	...	...	...	...	1·87	12	7·0
St. John's, N.B. ...	54·6	19	15·3	30	...	...	...	...	...	...	5·21	14	7·0
Victoria, B.C.	56·1	9	30·4	29	...	...	...	...	...	...	6·13	16	7·0
Dawson	22·0	1	-41·0	30	...	...	...	...	...	...	1·55	8	6·0

a and 22, 23. *b* and 27, 30.

Johannesburg.—Rainfall above the average.

Mauritius.—Mean temp. of air 2°·0, dew point 2°·7, relative humidity 1·3 per cent., and R 1·18 in. below, averages. Mean hourly velocity of wind 8·7 miles, or 2·0 below average.

MADRAS.—TS on one day, distant T on 3 days and L on one other day. Bright sunshine 131·1 hours.

KODAIKANAL.—Bright sunshine 110 hours.

COLOMBO.—Mean temp. of air 78°·7, or 1°·2 below, of dew point 0°·3 above, and R 2·41 in. above, averages. Mean hourly velocity of wind 6·6 miles.

HONGKONG.—Mean temp. of air 67°·4. Bright sunshine 204·4 hours. R 1·53 in. below averages. Mean hourly velocity of wind 10 8 miles.

Adelaide.—Mean temp. of air 4°·1 below average, and coldest on record in 49 years. R heaviest on record for 49 years, except 1903.

Sydney.—Mean temp. of air 1°·2 below, and R 1·05 in. above, averages.

Wellington.—R 1·13 in. above the average.

Auckland.—Mean temp. slightly above, and R 2·00 in. above averages.

TRINIDAD.—R 1·98 in. below 43 years' average.

Symons's
Meteorological Magazine.

No. 497. JUNE, 1907. Vol. XLII.

Wilhelm von Bezold.

Munich, 1837—Berlin, 1907.

Professor von Bezold, the eminent Director of the Prussian Meteorological Institute, died in his seventieth year, at Charlottenburg, after a long illness, on February 17th. He was born at Munich, and after graduating at Göttingen in 1860, returned to his native city, where he was engaged for many years as lecturer and professor of theoretical physics at the University. His first important investigation was on twilight phenomena, undertaken in consequence of the interest aroused by the far-famed afterglows visible in the Alps, and this was published in 1864. A few years later his attention was directed to the peculiarities of thunderstorms and he commenced an elaborate study, based largely on the statistics of insurance companies, of the frequency and periodicity of the phenomena. In 1878 he was appointed to reorganize and direct the meteorological service of Bavaria and remained in this office until 1885. In that year he was called to Berlin, on the death of Professor Dove, to undertake similar duties for the Prussian Meteorological Service, for it may be news to some of our readers to learn that there is no uniform imperial meteorological organization in Germany. In Berlin Dr. von Bezold filled the double position of Professor of Meteorology in the University and Director of the Prussian Meteorological Institute.

He continued his researches on the frequency of thunderstorms for a time, and gradually devoted himself more and more exclusively to the detailed discussion of the thermodynamics of the atmosphere and to terrestrial magnetism. While his later writings appeal mainly to the mathematical student, and have led to the opinion that the work of von Bezold lay rather in the advancement than in the spread of meteorological science, he was also the author of many papers of a more popular character, not a few of these being preliminary sketches which he afterwards elaborated in his classic memoirs. In his work at Berlin the late Director had the advantage of the co-operation of gifted colleagues, amongst whom Professor Hellmann, who had charge of the great rainfall system of Prussia, Professor Assmann, who had charge of the aeronautical observatory (now an independent institution), Professor Sprung of the instrumental department in Potsdam, and Professor A. Schmidt of the the magnetic observatory, may be mentioned.

RADIATION PHENOMENA IN SOUTH AFRICA.

MR. JAMES LYLE, of Grey College, Bloemfontein, who has charge of the Meteorological Service of the Orange River Colony, forwards for publication the two following letters, which were addressed to him by observers in the Colony, and we print them with great pleasure, recognising the growth of interest in the science of the weather which is taking place amongst the people as well as amongst the governments of South Africa.

During the last few years I have often observed heavy storm-clouds breaking over the Mabula mountains, about eight miles east from here, and wish to make known to you an unusual sight I saw this afternoon about 3 p.m. Heavy dark clouds were massed above these hills, with a gentle east wind blowing, when I observed what appeared like a jet descending from the clouds; shortly after, another appeared, and within five minutes the ends disappeared behind the hills like two gigantic kite tails and soon became obscured by heavy rain which began to fall.

I am sending you a rough sketch of the cloud and jets. Could you give me any information as to what it likely was?

A heavy shower of hail appeared to have fallen on Mr. Wright's farm in the Lady Brand District, over which the storm had taken its course. Two hours after the storm the hail on the veldt, although ten miles distant, had the appearance of a lake. Considerable damage must have been done to the growing crops and fruit trees.

Lions Rump, 12th November, 1906. W. F. GEBHARDT.

Lions Rump is situated in the Mabula mountains on the border of Basuto Land, and Mr. Lyle points out that 3 p.m. is the usual hour for thunderstorms and radiation phenomena generally. The sketches, which we are sorry we cannot reproduce, present very much the appearance of a tornado cloud, the "tails" being more slender and more inclined to the horizon than the waterspouts represented in Captain Page's article on p. 47 of our April number.

I thought perhaps you might like to have further particulars of the terrific hailstorm that passed over this district last Wednesday, December 19th.

I was away from this farm on that afternoon and only saw the storm in the distance, so cannot tell exactly how long it lasted, though I believe it was under half-an-hour.

The storm came from the N.W., and has devastated all the farms from Ficksburg to Brindisi, and apparently its track varied in width from 1½ to 3 miles. The hailstones are said to have been as large as hen's eggs, and all cultivated lands on this farm are pitted thickly with marks of this size. The corrugated iron roof on the stable here is deeply indented, and the rain gauge you sent me looks as if it had been knocked about with a hammer.

I am glad to say we lost no stock, though a neighbour this morning informed me he had a horse, a calf and five sheep killed by the hail, and his neighbour had also lost several sheep.

H. C. B. SPARROW.

Krauskloof, Ficksburg, O.R.C., December 21st, 1906.

Mr. Lyle points out that the hours, the direction and the breadth of the hailstorm are all quite usual. He has seen marks of hailstones on the land last for weeks, and cases are known of corrugated iron being perforated by angular hail. The rain gauge referred to was a copper instrument of the Meteorological Office pattern.

We may mention that exact observations of phenomena such as those described above are of real value, and we would urge on observers the importance of having a pocket camera within reach and photographing the effects described before they disappear. In the case of hail it is particularly important that some coins, or a footrule or other object of known size, should be placed amongst the hailstones so as to leave no doubt possible as to the size.

THE NEW PREMISES FOR THE METEOROLOGICAL OFFICE.

We referred in our number for October, 1906, (Vol. **41**, p. 165) to the proposed removal of the Meteorological Office from Victoria Street to South Kensington, and we now find some particulars of the new site in an article published in the *Morning Post* of May 21st, from which we extract the following :—

On referring to the Civil Service Estimates submitted to Parliament this session there is found under Sub-head A—New Works, Alterations, Additions, and Purchases—the item "Meteorological Office—Erection of Offices at South Kensington." The original estimate of the cost of the new office is given at £10,580, but of this sum the vote required for the current financial year is only £500, leaving £10,080 to be voted in subsequent years.

When it is stated that the spot selected for the future home of the Weather Department forms the south corner at the junction of Exhibition Road and Imperial Institute Road, surrounded by such magnificent piles of buildings as the Natural History Museum, the Victoria and Albert Museum, the Imperial Institute, &c., it is pretty obvious that £10,000 will go a very little way, indeed, towards providing an edifice at all comparable with its great neighbours. It is, therefore, a relief to learn on enquiry that the sum allotted by the Treasury for accommodating the Meteorological Office forms only a small portion of the cost of a large building which it has been decided to erect. . . . Plans have been prepared for the erection of a block of buildings on the spot mentioned above, the greater part to be occupied as the District Post and Telegraph Office for South Kensington, and the upper portion to be the National Meteorological Office provided with ample space for the staff and for visitors, and also with a separate library accommodation and convenient arrangements for the proper display of charts and diagrams. To the general reader the association of the two public services, the Post and the Weather, may not at first sight be obvious, but it is, for all that, a very real one. The telegrams to and from the Meteorological Office involve an expenditure of little short of £2,000 per annum, and as promptness is

essential in the receipt and despatch of reports, storm warnings, &c., it has thus far been necessary to provide private wires and instruments and a staff of telegraph clerks, so that the total cost of the telegraphic work of the establishment forms a very large proportion of the Parliamentary grant of £15,300 a year, for the Postmaster-General insists upon charging for providing private wires and instruments on the same scale as for the general public. With the transfer of the office to South Kensington the whole of this extra expense will be saved, the telegraphic work being performed by the Post Office staff in a neighbouring room. The public will very naturally suppose that there will also be a saving in the rent of the premises, that in a Government building a national department would be provided with quarters free of cost. But this is not so. The Treasury Authorities are too wide-awake to be caught napping on this point. Sir George Murray was instructed to state that "My Lords are favourably disposed to the proposal that premises shall be constructed for the Meteorological Office in a block of buildings to be erected at South Kensington to contain a post-office; and my Lords, on present information, believe that the rent payable by the Committee of such a building would not exceed by any considerable sum the amount expended by the Committee on the rent of their present premises." The Victoria Street rental is, it appears, £635 per annum, so that it looks as if my Lords mean to charge about 7 per cent., perhaps more, per annum on the estimated cost of new premises.

ROYAL METEOROLOGICAL SOCIETY.

THE first of the afternoon meetings for the present session was held on Wednesday, May 15th, at the Society's rooms, 70, Victoria Street, Westminster; Dr. H. R. Mill, President, in the chair.

In opening the meeting the President paid a tribute to the life and work of Dr. A. Buchan, F.R.S., the first recipient of the Society's Symons' Gold Medal, whose death had just been announced.

Dr. H. R. Mill read a paper on "The Standard Rain Gauge, with Notes on other Forms." When the late Mr. Symons founded the British Rainfall Organization, forty-seven years ago, such observations as were being carried on were made with rain gauges of the most varied patterns, set up at any height from the ground that suggested itself to the observer, and read irregularly at almost any hour of the day or night. Since that time there has been a steady approximation to uniformity, and now the greater number of rain gauges in use are of a few definite patterns, set for the most part at nearly the same height above the ground. Dr. Mill strongly recommends the Snowdon pattern of rain gauge, which is 5 inches in diameter, has a vertical rim to the funnel of 4 inches, and has an inner can and also a bottle. The larger Meteorological Office pattern of similar shape but 8 inches in diameter is equally accurate but unnecessarily large. He does not recommend rain gauges with shallow funnels, nor the Glaisher pattern, the latter being par-

ticularly liable to give readings that are much too high when it begins to go out of repair.

Mr. J. W. Lovibond read a paper "On a Method and Apparatus for measuring Fog Densities." The method is based on the power of selective absorption of suitably coloured glass. When this has been graded into mechanical scales of equivalent colour value, a beam of white light can be progressively absorbed to extinction and the luminous value of each successive absorption stated in quantitative terms. This analytical power also applies to the colour constituents of the beam.

Colonel J. E. Capper, R.E., C.B., gave an account of a captive balloon being struck by lightning at Farnborough during a thunderstorm on April 11th. The lightning flash appeared to travel along the wire until it reached the wagon; then a sudden bright light appeared and ran right up the wire into the clouds by which the balloon was hidden. The wire was fused, and burnt entirely away where it first touched the iron pulleys which guide the wire when running out. One side of the balloon and net was burnt, probably owing to the hydrogen catching fire.

Professor A. Herschel gave an account of a remarkable excavation made by lightning in peat earth on August 2nd or 3rd, 1906, in a moorland district of Northumberland. A large hole 4 or 5 feet in diameter was found on a flat part of the moor, radiating from which there were six or seven furrows, and pieces of turf were thrown in various directions. The largest turf, about 3 feet in diameter and 1 foot thick, was lying 26 yards away, and other pieces were lying around within 20 yards of the hole. On excavating the hole it was found that a number of small holes radiated to various depths.

The discussion on the various papers was joined in by the President, Mr. F. C. Bayard, Mr. E. Gold, Mr. W. Greathead, Mr. A. Hands, Professor A. Herschel, Mr. J. Hopkinson, Mr. R. Inwards, Mr. B. Latham, Mr. W. Marriott, and Mr. W. B. Tripp.

The following gentlemen were elected Fellows of the Society:—Mr. C. J. Davies, Rev. W. Esdaile, M.A., Shaikh Abul Fazl, M.A., LL.D., Mr. K. Nishizawa, Mr. R. Rhodes, and Mr. R. A. Ryves.

Correspondence.

To the Editor of Symons's Meteorological Magazine.

SNOW IN JUNE.

I THINK it will interest you to hear that snow fell in Farnham about 11.30 a.m. on the 3rd of this month. I did not see it myself, but I have it from a reliable witness.

GEO. CHRYSTIE.

Short Heath Lodge, Farnham, Surrey, June 6th, 1907.

THE ENERGY OF STORMS.

THERE is a statement in your Magazine for May which should not pass without comment. The question whether the heat set free by the condensation of vapour is or is not sufficient to provide the energy of a cyclone, is one that can be settled by a direct and simple calculation, and does not depend on the opinion of the best or the worst thinkers. The principles involved and the numerical quantities required can be found in any good text-book on physics.

The heat set free by the condensation of one pound of vapour, under average conditions of temperature, will raise the temperature of 600 lbs. of water 1° C. Taking Joule's equivalent at 1390 for 1° C., this gives 600×1390 ft. lbs. of energy for each pound condensed. Now, a rainfall of ·01 in. deposits ·052 lbs. on each square foot of surface, and hence provides $600 \times 1390 \times \cdot052 = 43{,}368$ ft. lbs. of energy for each square foot.

The mass of air resting on each sq. ft. is about $15 \times 12 \times 12$ lbs., and hence the energy produced by the formation from vapour of ·01 in. of rain can raise the whole weight of air over the rainfall area $\frac{43368}{12 \times 12 \times 15} = 20{\cdot}8$ ft., or impart to it a velocity due to a fall of 20·8 ft., that is, using the formula $V^2 = 2\,gs$, a velocity of a little over 36 ft. per second, or 25 miles an hour.

For a rainfall of ·04 the corresponding velocity is 50 miles per hour, force 9 on the Beaufort scale.

Further, we may remember that the whole mass of air to its upper limit is not involved in a cyclone, and since a smaller mass is involved, the velocity will be greater. Also the rain need not fall, the energy is supplied by the change from vapour to cloud, and the equivalent of ·04 in. of rain may be contained in a cloud of 1,000 ft. thickness or less.

Since the cyclones of our latitudes seldom give less than ·10 in. of rain along their track, and the tropical hurricanes frequently give 10·0 in. or more, the latent heat of condensation certainly can provide a most ample supply of energy. It does not follow that cyclones are necessarily generated and maintained in this manner; they present at the present time an unsolved problem, and it is certain that in some circumstances heavy rains do not produce wind. On the other hand, cyclones certainly prefer localities where there is a copious supply of moisture, and, personally, I believe that the chief motive and sustaining power is the heat produced by the condensation of vapour.

W. H. DINES.

WARM AND COLD SEASONS.

THE following classification of the last 65 years at Greenwich (reckoned as made up of Spring, Summer, Autumn and Winter, *i.e.*, March to February) may be of interest.

Call a season warm (W.) where two or three months are warm (*i.e.*, with mean temperature above the average); cold (C.) in the opposite case. Then we have:

	Spring.	Sum.	Autm.	Win.			
1.	W.	W.	W.	W.	...	'47, '65, '72, '95, '01	5
2.	W.	W.	W.	C.	...	'46, '57	2
3.	W.	W.	C.	C.	...	'59, '70, '78	3
4.	W.	C.	C.	C.	...	'54, '64, '67, '80	4
5.	C.	C.	C.	C.	...	'53, '60, '79, '88, '89, '92	6
6.	C.	C.	C.	W.	...	'45, '50, '02	3
7.	C.	C.	W.	W.	...	'66, '83, '98	3
8.	C.	W.	W.	W.	...	'55, '58, '61, '76, '97, '00	6
9.	W.	C.	C.	W.	...	'41, '71, '81	3
10.	W.	C.	W.	W.	...	'43, '48, '62, '82	4
11.	W.	W.	C.	W.	...	'42, '68, '84, '93, '96, '04, '05 ...	7
12.	C.	W.	W.	C.	...	'86, '99	2
13.	C.	W.	C.	C.	...	'56, '75, '85, '87	4
14.	C.	C.	W.	C.	...	'44, '69, '91	3
15.	C.	W.	C.	W.	...	'51, '52, '73, '77	4
16.	W.	C.	W.	C.	...	'49, '63, '74, '90, '94, '03	6
							65

We find that years with a preponderance of warm seasons number 24; cold seasons, 20; two warm, two cold, 21.

I would invite comment on these facts.

ALEX. B. MACDOWALL.

THE WEATHER AT GREENWICH IN MAY, 1906 & 1907.

I HAVE made notes of above, and the similitude of the two months being so striking, I thought it worthy of record. Here are the figures:—

	Mean. bar.	Thermometer. max.	min.	mean.	Rainfall. inches.	Wind. miles.	Sun. hours.	Air. frosts.
1906 ...	29·70	62·3	44·3	53·3	1·56	8410	153	1
1907 ...	29·70	62·2	44·3	53·25	1·56	8283	159	1

Thus barometer, thermometer, and rainfall readings are practically identical, and wind and sunshine nearly so. The only variation is in the number of days' rainfall, which was 12 in 1906 and 18 in 1907.

ARTHUR F. PARBURY.

Haslemere, Surrey, 6th June.

THE GLOOM OF APRIL, 1907.

THE unusual character of the past month is well shown for London by the fact that the quarter hours of day-darkness (*i.e.*, during office hours, 9 a.m. to 5 p.m., see this Magazine for January, 1902, Vol. **36**, p. 194) were more than double the total of the previous 9 years of records, and even the number of days was as great.

This is shown by the following table :—

	1898.	'99.	1900.	'01.	'02.	'03.	'04.	'05.	'06.	'07.	Total.		Mean.	
											9 yrs.	10 yrs	9 yrs.	10 yrs
Days, April	0	1	1	1	1	1	1	3	0	10	9	19	1	1·9
Quarter hrs., Apr.	0	3	1	1	11	2	2	4	0	57	24	81	2·6	8·1
Do., Apr. to Sep.	2	11	5	14	21	42	9	(8)	5	—	134	—	14·9	—

The mean number of quarter hours in the various months (as given in the above-mentioned note) ran : October, 30 ; November, 91½ ; December, 131 ; January, 110 ; February, 35 ; March, 26 ; and total, April to September, 17. Hence the past April brought more darkness (mainly due to fog) than the average of any but the three foggiest months.

J. EDMUND CLARK.

8, Chiswell Street, E.C., 1st May, 1907.

THUNDERSTORM OF JUNE 1st.

A HEAVY thunderstorm, accompanied by a deluge of rain, passed over this district between 11.35 a.m. and 12.15 p.m. on the above date. The storm came up from the N.W., and working round by the W. and S.W., passed away towards S. and S.E. along the North Downs.

Thunder was first heard at 11.35 a.m. At 11.44 a.m. the interval between lightning and thunder was two seconds. At noon the very vivid forked lightning was followed instantaneously by thunder. At 0.7 p.m. a vivid flash of forked lightning, bright blue in colour, was seen due W., the interval to thunder being 3 seconds. Thunder was last heard in the S. at 0.15 p.m.

Rain fell between 11.50 a.m. and 0.10 p.m., and the amount measured was ·80 in. in 20 minutes. Very variable airs to a dead calm prevailed during the storm. Between 2.20 p.m. and 2.45 p.m. thunder was again heard in the S.W. and W., and between 5.45 p.m. and 6 p.m. in the N.E.

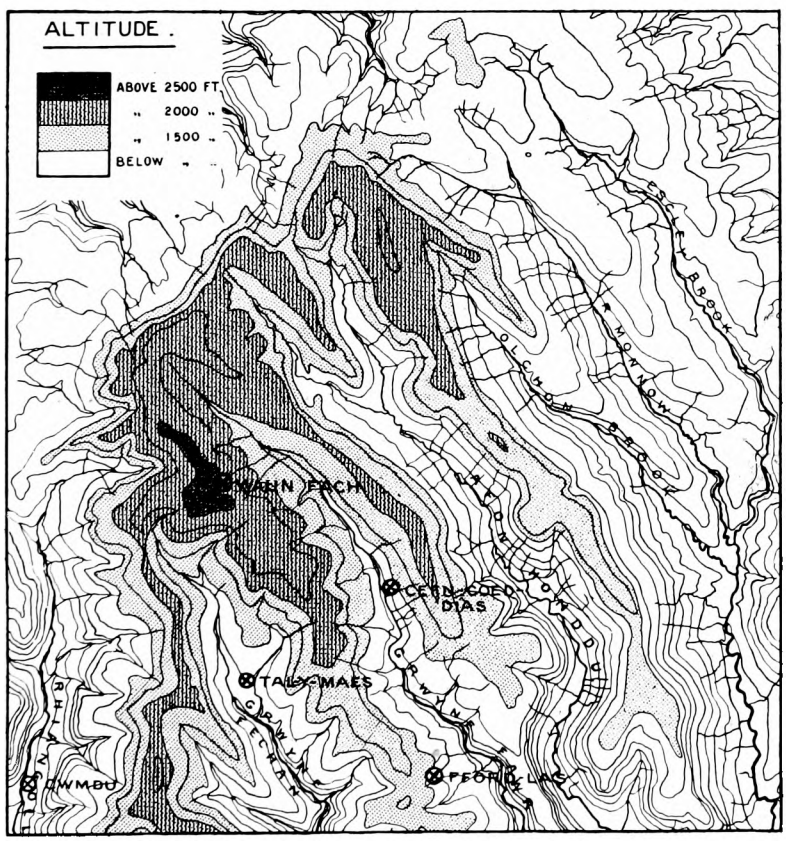
SPENCER C. RUSSELL, F.R.Met.Soc.

Epsom, June 1st, 1907.

RAIN GAUGES ON THE BLACK MOUNTAINS.

By Rev. R. P. Dansey.

This mountain group lies in the counties of Brecon, Monmouth and Hereford, and is of great extent. It consists of four long ridges, each eight to twelve miles in length, separated by parallel valleys running S.S.E. The two northern of these give birth to streams which run north and then east, draining into the Monnow and then the Wye. The two southern run south and find their way into the Usk. The map below shows the contour lines for each 100 feet up to 1000 feet, and thereafter for each 250 feet to the summit. The closeness of the contour lines is of course proportional to the steepness of the mountain slope, and the rivers which are shown and named indicate the lowest lines of the valleys. The view of the mountains from the east is not very impressive, only the outline of the long straight ridge which forms the first rampart of the mountains being visible, low on the horizon, from my Rectory at Kentchurch, about 10 miles distant to the east.



Dr. H. R. Mill having kindly provided me with a rain gauge, I set it up on the 11th of March last at the point marked on the map as Waun Fach, at a height of 2500 feet, that is to say about 160 feet below the summit. The setting up of this long Bradford pattern rain gauge was not without difficulty; I had to carry it on my bicycle for 20 miles, the last 10 of which were extremely rough. When the bicycle had done its work it had taken me—and in bad places I had taken *it*—to Capel-y-ffin, over 1000 feet above sea level, in the valley of the Afon Honddu, close to the monastery of Father Ignatius. After a few minutes' rest, the "2nd" ridge to the S.W., over 2000 feet, had to be climbed, and a descent made into the next parallel valley, that of the Grwyne Fawr, and then the final ascent of Waun Fach, the summit of the whole group, was at last achieved.

My wife went with me to take the first measurement, on April 1st —the double journey making 40 miles on bicycles and 8 to 10 miles of walking, including the crossing of a ridge over 2000 feet twice, and dropping down to 1500 feet and then up again to 2660 feet, not a bad day's work for a lady. It was in the glorious anti-cyclonic weather which lasted over Easter, and the heat was like midsummer. The amount found in the gauge was 1·90 in., which had accumulated since March 11th; for the corresponding period at Kentchurch the fall had been ·51 in. The gauge had not been interfered with, and some stamp paper with which I had sealed the funnel to the body of the gauge was still intact. The temperature on the summit was 56°, and the maximum here during the day had been 61°; and on March 11th the temperature on the summit had been 30° at 3 p.m., and the maximum at Kentchurh 44°. On April 1st there was one drift of snow still left in a corrie half-a-mile N.W. of the gauge.

I photographed the gauge, and my wife washed her face with the 1·90 in. of rain and said it was delicious. The photograph is reproduced on next page, and shows the flatness of the grassy ridge on which it is placed, and of two of the other ridges to the N.N.E., one of which we had crossed.

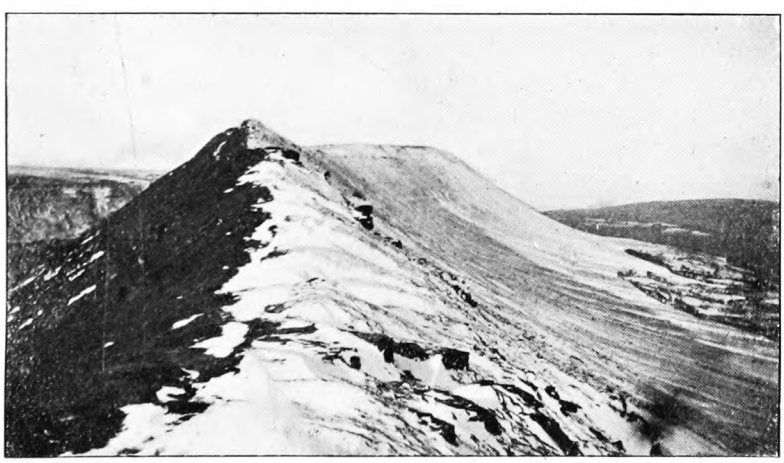
The second photograph is that of a ridge which joins the first ridge at the extreme N.N.W. end of the group; this small ridge, which is called the Black Hill, will be seen on the map forming the north-easterly side of the upper valley of the Olchon Brook. It is three or four miles in a straight line from the rain gauge, which is on the third or highest ridge. In the photograph the snow has all gone on the S.W. side while the N.E. side remains covered.

The first complete month's measurement with the Waun Fach gauge was made on April 30th, when I was accompanied in visiting it by my brother. The weather was very bad, but decidedly interesting. On the summit there was a furious gale and a temperature of 34° at 3 p.m., and it would have been almost impossible to have measured the water in the gauge without the help I fortunately had. The fall for April was found to be 5·85 in., against 3·33 in. at Kentchurch, which I may mention is only 210 feet above sea level. On our way

back to Capel-y-ffin a thick snow blizzard came on; when crossing the second ridge, that between the Grwyne Fawr and Afon Honddu valley, at 2000 feet, temperature fell from 40° to 32°, and in a few minutes the whole place was white down to about 1500 feet. The storm lasted for about 20 minutes.

THE WAUN FACH RAIN GAUGE.

On June 1st the measurement for May was successfully taken, and a fine and warm day among extremely bad weather favoured me, the thunderstorms which prevailed in the London district not extending near here. The May fall was found to be 5·30 in., against 3 08 in. at Kentchurch.



THE BLACK HILL RIDGE OF THE BLACK MOUNTAINS.

The Black Mountains form an extremely interesting group from the point of view of rainfall. and from other points of view as well. They are too vast and inaccessible for the tourist, and the raven breeds unmolested in some of the rocky crags above Capel-y-ffin and elsewhere. Three rain gauges, originally set up by the London County Council, are being maintained in the lower valleys by Dr. Mill, their positions being shown on the map at Ffordlas, Tal-y-maes and Cwm-ddu. One has been started, I believe, by Mr. Baker-Gabb, of Abergavenny, at Cefn-coed-dias, and I understand that there are some gauges for a proposed water works in one of the valleys, but their positions are not known. It would, however, be very interesting to obtain further records on the ridges and especially at the upper ends of the valleys. If two gauges were set up between Capel-y-ffin and the summit gauge, they would all be "in the day's work" or rather "walk," so to speak, and would entail hardly any extra trouble, if means could be found to provide the instruments. Of course, in stations like this it is hopeless to expect a daily record of the rainfall, and it is impossible even to be sure of a monthly record read with absolute regularity on the first day of every month, but still, monthly readings, varying it may be by a day or two from the fixed date, can give extremely important information on the subject. Winter will be the most difficult time for obtaining systematic records; last winter the "Rain Gauge Ridge" was, I believe, never entirely without snow from November to April, and in severe frost a shaving lamp to melt the frozen water in the gauge will probably be a necessary article of equipment.

REVIEWS.

Verwandlung von Fahrenheitgraden in Centesimalgrade und umgekehrt [Conversion of Fahrenheit degrees into Centigrade degrees and *vice versa*]. Von G. HELLMANN (Berlin). From the Naturwissenschaftliche Rundschau XXI., No. 38. Pp. 2.

DR. HELLMANN in this note points out a convenient rule for the conversion of the two thermometer scales—double the centigrade temperature, subtract one-tenth of this and add 32 to get the Fahrenheit temperature. Subtract 32 from the Fahrenheit temperature. halve this result and add one-tenth and one-hundredth of that half to get the centigrade temperature. The rules are very simple and obvious, and must have occurred to many workers. That for converting centigrade into Fahrenheit temperatures was published in the article *Thermometer* in the ninth edition of the *Encyclopædia Britannica* nearly twenty years ago, though Dr. Hellmann was not aware of this.

The Physiography of the River Nile and its Basin. By CAPTAIN H. G. LYONS, Director-General Survey Department. Cairo National Printing Department, 1906. Size 11 × 7½, pp. viii. + 412.

THIS is a remarkable work dealing with the physiography of the Nile, from its sources south of the Victoria Nyanza to its delta in the Mediterranean Sea. It deals in successive chapters with the different sections of the river and its chief tributaries, and the references to the very large literature of the subject appear to be exhaustive. The numerous maps are produced with a clearness and delicacy of colouring that reflect the greatest credit on the Survey Office at Cairo, and are far superior to those illustrating most Government publications in this country.

Captain Lyons gives monthly rainfall maps for the whole Nile Basin, which although necessarily founded on very incomplete data, succeed at least in bringing such data as do exist into a very reasonable relationship. The climate of the various parts of his vast region is treated very fully, most of the available figures being quoted, while the utmost use is made of the long records of the height of the Nile at different seasons. The book culminates in a masterly study of the variations of the Nile floods for the period of about 175 years throughout which the records appear to be trustworthy and comparable. With this unique set of observations of a quantity which is in the most intimate dependance on climate it is a little disappointing to learn that no regular alternation of high and low flood is to be found. Captain Lyons sums up the relations of meteorological conditions and the floods of the Nile as follows:—

"Turning to the meteorological conditions, atmospheric pressure in north-eastern Africa appears to vary inversely as the rainfall of Abyssinia, and a similar relation between pressure and rainfall has been demonstrated in other parts of the globe. The distribution of pressure in the summer months in the light of recent information shows that the Asiatic low pressure in the monsun season is abruptly terminated about the meridian of the Nile valley, and to the west of this there is probably an area of almost equal pressure intervening between it and the high pressure of the Azores action-centre, while in summer a low pressure area may lie to the south-west. The encroachment of this high pressure on the eastern part of North Africa may produce there the unfavourable conditions of high pressure, which have been recognised as coinciding with deficient rainfall on the Abyssinian tableland, while conversely its withdrawal so as to allow of deepening or extension of the low pressure trough, probably acts favourably towards the conditions of precipitation in Abyssinia.

"It seems that the two principal factors to be considered are, firstly, the strength of the south-east trade winds as they progress from the south to the north of the equator, along the eastern coast of Africa, and secondly, the excess or defect of atmospheric pressure in the area represented by Aden, Cairo, Beirut, and the region lying to the west of this; the sub-equatorial rainfall in early summer must also be considered.

"So far as our knowledge goes at present it may be said that :—

"(1). Generally speaking the curve of Nile floods varies inversely as the mean barometric pressure of the summer months, high pressures accompany low floods, and low pressures accompany high floods.

"(2). These pressure variations show a great similarity over wide areas, but seem to be to some extent dependent upon the position of the Azores high pressure 'action-centre.'

"(3). Taking the monthly means of atmospheric pressure, this relation is even more clearly shown, and pressure above or below the normal in months of the rainy season of Abyssinia coincides closely with deficiency or excess of rainfall.

"(4). Taking the 37 years—1869 to 1905—in six years out of seven a very fairly accurate prediction of the flood from month to month could have been made, and there seems a reasonable probability that further and more detailed study of the conditions above described may increase the reliability.

"(5). The effect of excessive sub-equatorial rainfall in April and May in the neigbourhood of Zanzibar, seems to have a distinctly prejudicial effect on Abyssinian rains."

Meteorological Observations at Stations of the Second Order. Published by the Authority of the Meteorological Committee. For the year 1901, and for the year 1902. (Size 10 × 10. Pp. xiv. + 180. Price 22s. 6d. each.) Edinburgh: Printed for H.M. Stationery Office.

Hourly Readings obtained from the Self-recording Instruments at four Observatories in connexion with the Meteorological Office. Published by the Authority of the Meteorological Committee. 1903, 1904, 1905. Three volumes. (Size 12 × 10. Pp. xiv.+ 198. Price 25s. each.) Printed for H.M. Stationery Office.

THE Meteorological Office has now come up to date in the matter of the publication of the volumes of "Hourly Readings," and we season our gratitude with the hope that the volumes of "Second Order" observations will soon be in an equally forward state. There is not much to be said as a rule of official publications, the successive volumes of which do not even vary in the number of their pages, but the last volume of Hourly Readings has an important announcement in the preface—viz., that the readings of the Robinson anemometer are now calculated on the basis that the movement of the wind is 2·2 times as fast as the speed of revolution of the cups. Former volumes gave the wind velocities calculated on the assumption that the wind moved with three times the speed of the cups. We accordingly warn those of our readers who are on the watch for evidence of secular change to deal warily with the wind records before and after 1905.

METEOROLOGICAL NEWS AND NOTES.

MR. ANDREW WATT, M.A., has, we learn with pleasure, been appointed Meteorological Secretary of the Scottish Meteorological Society, in succession to the late Dr. Buchan.

M. ST. C. HEPITES has retired from the direction of the Rumanian Meteorological Institute at Bukharest, after having held the office for twenty-three years. He is succeeded by M. I. St. Murat, but will continue to interest himself in the scientific work being carried on at the Institute.

"BRITISH RAINFALL, 1906," has now reached that stage of compilation when it is urgent that all returns not already received must be sent in within a week, if they are to be inserted in the general table of rainfall. It is now too late to utilize such returns for the various detailed discussions of rainfall data.

MR. WILLIAM GRIFFITHS, who died this month at Holyhead, aged 81, is described in the *Liverpool Daily Post and Mercury* as a great weather prophet. The notice states "that before steam became general, hundreds of sailing vessels used Holyhead Refuge Harbour, and it was the custom for the masters of these craft to be guided in their sailings by the advice of deceased as to the coming weather. Deceased was the author of some treatises on meteorology and chronology, which were favourably reviewed by the Press. . . . In 1863 he predicted the gale known locally as 'the three-fingered Jack gale,' when thirty-three vessels broke from their moorings at Holyhead and went upon the rocks, with disastrous results."

MESSRS. PASTORELLI AND RAPKIN have forwarded a specimen of their "Meteorological Register" for hanging up. Twelve perforated sheets, 8½ by 5½ inches in size, are provided with a cardboard back and pencil at top. The sheet is ruled in the upper half for a barometer curve and in the lower half for observations of direction of wind, rainfall, maximum, minimum, wet and dry thermometers; but only for one daily reading. The register is neat and attractive, and the price is one shilling.

AN ORIGINAL REMARK ABOUT THE WEATHER was recently asked for in a prize competition by the *Westminster Gazette*, and the following—one of which we have heard before—won the two prizes:—

(1.) The gods became bored with their quiet lives on stormless Olympus. Zeus, fearing the effects of excessive nectarism, and thinking gambling the lesser evil, instituted a celestial form of "rouge et noir," the stakes for him who should successfully prophesy to-morrow's weather. Since then he has kept them pleasantly amused.

(2.) It was particularly wet in parts of Scotland during August of last year. A gentleman who had a shooting in a Perthshire glen remarked to an old gamekeeper that during the month they had four good days. "Yes," said the old man, "but the Sabbath 'nippet' up three of them."

TEMPERATURE FOR MAY, 1907.

STATION.	COUNTY.	Lat. N.	Long. W. [*E.]	Height above Sea. ft.	TEMPERATURE. Max. °	Date.	Min. °	Date.	No. of Nights at or below 32°. Shade.	Grass.
Camden Square	*London*	51 32	0 8	111	82·3	12	35·9	20	0	1
Tenterden	*Kent*	51 4	*0 41	190	76·0	12	34·0	19, 20	0	4
West Dean	*Hampshire*	51 3	1 38	137	73·0	12	31·0	19	1	7
Hartley Wintney	,,	51 18	0 53	222	77·0	12	32·0	18, 19	2	6
Hitchin	*Hertfordshire*	51 57	0 17	238	79·0	12	32·0	19	1	...
Winslow (Addington)	*Buckinghamshr.*	51 58	0 53	309	80·0	12	32·0	19	1	3
Bury St. Edmunds (Westley)	*Suffolk*	52 15	*0 40	226	79·0	11	31·5	20	1	...
Brundall	*Norfolk*	52 37	*1 26	66	80·0	11	33·8	21	0	2
Winterbourne Steepleton	*Dorset*	50 42	2 31	316	66·8	12, 27	29·0	21	2	5
Torquay (Cary Green)	*Devon*	50 28	3 32	12	69·0	26	36·9	20	0	0
Polapit Tamar [Launceston]	,,	50 40	4 22	315	69·2	28	30·1	20	2	5
Bath	*Somerset*	51 23	2 21	67	76·0	12	35·0	18	0	...
Stroud (Upfield)	*Gloucestershire*	51 44	2 13	226	76·0	12	42·0	18	0	...
Church Stretton (Woolstaston)	*Shropshire*	52 35	2 48	800	76·0	12	26·0	19, 22	13	...
Coventry Kingswood	*Warwickshire*	1 30	52 24	340	68·0	6, 25	35·0	18, 21	0	...
Boston	*Lincolnshire*	52 58	0 1	25	81·0	12	35·0	5, 18	0	...
Worksop (Hodsock Priory)	*Nottinghamshire*	53 22	1 5	56	80·6	12	30·3	22	2	9
Derby (Midland Railway)	*Derbyshire*	52 55	1 28	156	83·0	12	31·0	21	1	...
Bolton (Queen's Park)	*Lancashire*	53 35	2 28	390	70·4	12	33·4	22	0	4
Wetherby (Ribston Hall)	*Yorkshire, W.R.*	53 59	1 24	130	...	...	...	...	...	...
Arncliffe Vicarage	,, ,,	54 8	2 6	732	...	...	...	...	...	...
Hull (Pearson Park)	,, *E.R.*	53 45	0 20	6	80·0	11	35·0	22	0	10
Newcastle (Town Moor)	*Northumberland*	54 59	1 38	201	...	..	...	...	...	...
Borrowdale (Seathwaite)	*Cumberland*	54 30	3 10	423	69·5	24	34·3	2	0	...
Cardiff (Ely)	*Glamorgan*	51 29	3 13	53	..	...	...	...	...	...
Haverfordwest (High Street)	*Pembroke*	51 48	4 58	95	71·3	28	34·3	22	0	0
Aberystwyth (Gogerddan)	*Cardigan*	52 26	4 1	83	78·0	28	27·0	17	...	...
Llandudno	*Carnarvon*	53 20	3 50	72	...	...	...	...	...	...
Cargen [Dumfries]	*Kirkcudbright*	55 2	3 37	80	68·0	24	32·0	23	1	...
Lilliesleaf (Riddell House)	*Roxburgh*	55 31	2 46	550	...	...	...	...	...	...
Edinburgh (Royal Observy.)	*Midlothian*	55 55	3 11	442	64·5	13	34·8	2	0	2
Girvan (Pinmore)	*Ayr*	4 49	55 10	207	66·0	24, 27	31·0	19	2	...
Glasgow (Queen's Park)	*Renfrew*	55 53	4 18	144	68·0	27	34·0	15, 17	0	2
Tighnabruaich	*Argyll*	55 55	5 14	50	66·0	27	32·0	14, 18	2	3
Mull (Quinish)	,,	56 36	6 13	35	68·0	26	...	...	...	...
Dundee (Eastern Necropolis)	*Forfar*	56 28	2 57	199	69·1	13	35·0	29	0	...
Braemar	*Aberdeen*	57 0	3 24	1114	...	...	...	...	...	...
Aberdeen (Cranford)	,,	57 8	2 7	120	63·0	10†	30·0	4	1	...
Cawdor (Budgate)	*Nairn*	57 31	3 57	250	...	...	...	...	...	...
Invergarry	*E. Inverness*	57 4	4 47	13c?	...	...	...	...	...	...
Loch Torridon (Bendamph)	*W. Ross*	57 32	5 32	20	...	...	...	...	...	...
Dunrobin Castle	*Sutherland*	57 59	3 56	14	61·0	11	34·0	19	0	0
Castletown	*Caithness*	58 35	3 23	100	69·0	26	30·0	3, 4	4	...
Killarney (District Asylum)	*Kerry*	52 4	9 31	178	72·5	29	34·5	23	0	...
Waterford (Brook Lodge)	*Waterford*	52 15	7 7	104	...	..	...	...	...	...
Broadford (Hurdlestown)	*Clare*	52 48	8 38	167	72·0	27	32·0	4	1	...
Abbey Leix (Blandsfort)	*Queen's County*	52 56	7 17	532	66·0	26, 27	...	...	...	...
Dublin (Fitz William Square)	*Dublin*	53 21	6 14	54	67·5	27	34·4	1	0	1
Ballinasloe	*Galway*	53 20	8 15	160	76·0	25, 27	27·0	18	7	...
Clifden (Kylemore House)	,,	53 32	9 52	105	...	...	...	...	...	...
Crossmolina (Enniscoe)	*Mayo*	54 4	9 18	74	...	...	...	...	...	...
Seaforde	*Down*	54 19	5 50	180	71·0	27	32·0	22	1	2
Londonderry (Creggan Res.)	*Londonderry*	54 59	7 19	320	...	...	...	...	...	...
Omagh (Edenfel)	*Tyrone*	54 36	7 18	280	68·0	28	32·0	18	0	...

† and 11, 14, 23.

RAINFALL FOR MAY, 1907.

RAINFALL OF MONTH.							RAINFALL FROM JAN. 1.					
Aver. 1870-99.	1907.	Diff. from Av.	% of Av.	Max. in 24 hours.		No. of Days	Aver. 1870-99.	1907.	Diff. from Aver.	% of Av.	Mean Annual 1870-1899.	STATION.
in.	in.	in.		in.	Date.		in.	in.	in.		in.	
1·72	1·74	+ ·02	101	·28	7	17	8·54	8·01	— ·53	94	25·16	Camden Square
1·72	2·01	+ ·29	117	·31	2	18	9·59	8·47	— 1·12	88	28·36	Tenterden
1·86	2·15	+ ·29	116	·54	13	19	10·59	9·52	— 1·07	90	29·93	West Dean
1·79	1·65	— ·14	92	·36	11	16	9·70	9·23	— ·47	95	27·10	HartleyWintney
1·87	3·19	+1·32	170	·85	13	21	8·37	8·97	+ ·60	107	24·66	Hitchin
2·06	2·96	+ ·90	144	1·40	13	17	9·29	8·83	— ·46	95	26·75	Addington
1·85	3·52	+1·67	190	1·01	13	18	8·28	10·21	+ 1·93	123	25·39	Westley
1·74	2·57	+ ·83	148	·65	31	19	8·23	10·66	+ 2·43	130	25·40	Brundall
2·02	2·17	+ ·15	107	·34	1	18	14·04	11·95	— 2·09	85	39·00	Winterbourne Stpltn
1·96	3·48	+1·52	178	·51	6	21	12·92	11·55	— 1·37	85	35·00	Torquay
1·98	3·06	+1·08	155	·45	9	21	13·33	13·28	— ·05	100	38·85	Polapit Tamar
2·09	2·97	+ ·88	142	·58	13	17	10·72	9·73	— ·99	91	30·75	Bath
2·10	1·77	— ·33	84	·26	22	18	10·60	8·62	— 1·98	81	29·85	Stroud
2·62	3·05	+ ·43	116	·58	6	19	11·85	10·73	— 1·12	91	33·04	Woolstaston
2·11	4·80	+2·69	227	2·37	13	18	10·15	9·73	— ·42	96	29·21	Coventry
1·73	3·08	+1·35	178	·75	14	18	7·82	8·09	+ ·27	103	23·30	Boston
2·01	2·91	+ ·90	145	·44	31	23	8·57	8·21	— ·36	96	24·70	Hodsock Priory
1·96	3·84	+1·88	196	·67	14	19	8·78	9·86	+ 1·08	112	26·18	Derby
2·46	4·38	+1·92	178	·79	30	21	13·54	14·90	+ 1·36	110	42·43	Bolton
1·90	3·66	+1·76	193	·78	31	19	9·25	9·99	+ ·74	108	26·96	Ribston Hall
3·36	5·41	+2·05	161	1·35	30	22	22·78	25·34	+ 2·56	111	60·96	Arncliffe Vic.
1·95	3·91	+1·96	201	·92	31	23	9·12	9·28	+ ·16	102	27·02	Hull
1·89	4·36	+2·47	231	1·10	14	21	9·32	9·75	+ ·43	105	27·99	Newcastle
7·26	10·18	+2·92	140	2·56	1	21	50·39	46·14	— 4·25	92	132·68	Seathwaite
2·55	2·83	+ ·28	111	·48	3	18	14·66	12·89	— 1·77	88	42·81	Cardiff
2·53	3·58	+1·05	141	·73	30	16	17·06	14·05	— 3·01	82	47·88	Haverfordwest
2·44	3·79	+1·35	155	1·59	6	13	14·66	14·85	+ ·19	101	45·41	Gogerddan
1·85	1·64	— ·21	89	·31	30	19	10·18	7·66	— 2·52	75	30·98	Llandudno
2·60	5·44	+2·84	209	·86	1	17	16·07	17·63	+ 1·56	110	43·43	Cargen
2·07	...	...	...	...	...	...	11·44	...	...	...	33·04	Riddell House
...	2·75	...	...	·77	21	19	...	7·74	...	...	...	Edinburgh
2·73	4·66	+1·93	171	·99	30	22	17·57	..	...	...	48·87	Girvan
2·36	4·08	+1·72	173	·66	21	18	12·24	14·94	+ 2·70	122	35·80	Glasgow
3·21	4·68	+1·47	146	·53	1, 21	16	20·89	22·75	+ 1·86	109	57·90	Tighnabruaich
2·91	3·74	+ ·83	128	·92	1	19	20·29	21·45	+ 1·16	106	57·53	Quinish
1·88	4·20	+2·32	223	1·05	31	19	9·94	9·80	— ·14	99	28·95	Dundee
2·29	3·73	+1·44	163	...	...	...	12·50	13·11	+ ·61	105	36·07	Braemar
2·20	4·36	+2·16	198	·97	31	22	11·60	11·24	— ·36	97	33·01	Aberdeen
2·03	3·29	+1·26	162	·84	21	17	9·68	10·95	+ 1·27	113	29·37	Cawdor
2·84	4·09	+1·25	144	1·21	1	10	21·87	26·78	+ 4·91	122	56·00	Invergarry
5·05	4·52	— ·53	90	1·75	1	17	31·26	40·85	+ 9·59	131	86·50	Bendamph
2·02	2·18	+ ·16	108	·78	31	12	11·31	13·65	+ 2·34	121	31·60	Dunrobin Castle
...	1·32	...	...	·55	21	14	...	12·90	...	...	...	Castletown
2·95	4·04	+1·09	137	·62	6, 10	18	22·70	15·77	— 6·93	69	58·11	Killarney
2·11	...	..	...	...	...	...	14·58	...	...	...	39·30	Waterford
2·09	2·66	+ ·57	127	·44	29	16	11·60	12·45	+ ·85	107	33·47	Hurdlestown
2·27	3·51	+1·24	155	·64	6	19	12·77	12·04	— ·73	94	35·19	Abbey Leix
1·94	3·21	+1·27	165	1·12	6	17	9·93	9·49	— ·44	96	27·75	Dublin
2·49	3·71	+1·22	149	·84	6	20	13·23	13·55	+ ·32	102	37·04	Ballinasloe
4·61	4·69	+ ·08	102	1·20	30	13	28·96	24·70	— 4·26	85	80·23	Kylemore House
2·93	5·07	+2·14	173	·84	6	22	18·79	20·53	+ 1·74	109	50·50	Enniscoe
2·45	5·73	+3·28	234	1·39	30	21	14·20	14·99	+ ·79	106	38·61	Seaforde
2·48	4·01	+1·53	162	·66	30	19	14·15	20·59	+ 6·44	146	41·20	Londonderry
2·43	3 60	+1·17	148	...	...	..	12·98	16·64	+ 3·66	128	37·85	Omagh

SUPPLEMENTARY RAINFALL, MAY, 1907.

Div.	STATION.	Rain. inches	Div.	STATION.	Rain. inches
II.	Abinger Hall	3·26	XI.	Rhayader, Tyrmynydd	...
,,	Ramsgate	2·38	,,	Lake Vyrnwy	3·92
,,	Hailsham	3·11	,,	Llangyhanfal, Plâs Draw	2·53
,,	Crowborough, Uckfield Lodge	2·89	,,	Criccieth, Talarvor	2·30
,,	Totland Bay, Aston House	1·65	,,	Llanberis, Pen-y-pass	7·78
,,	Emsworth, Redlands	2·87	,,	Lligwy	2·67
,,	Alton, Ashdell	2·12	,,	Douglas, Woodville	3·54
,,	Newbury, Welford Park	2·14	XII.	Stoneykirk, Ardwell House	4·18
III.	Harrow Weald, Hill House.	1·69	,,	Dalry, The Old Garroch	6·08
,,	Oxford, Magdalen College	2·37	,,	Langholm, Drove Road	5·64
,,	Bloxham Grove	3·16	,,	Moniaive, Maxwelton House	5·37
,,	Pitsford, Sedgebrook	4·93	XIII.	N. Esk Reservoir [Penicuick]	3·30
,,	Huntingdon, Brampton	4·32	XIV.	Maybole, Knockdon Farm	3·85
,,	Wisbech, Bank House	1·89	XV.	Campbeltown, Witchburn	5·91
IV.	Southend Water Works	2·14	,,	Inveraray, Newtown	4·96
,,	Colchester, Lexden	2·29	,,	Ballachulish House	7·56
,,	Newport, The Vicarage	2·84	,,	Islay, Eallabus	4·29
,,	Rendlesham	1·92	XVI.	Dollar Academy	4·66
,,	Swaffham	2·44	,,	Loch Leven Sluice	3·69
,,	Blakeney	2·51	,,	Balquhidder, Stronvar	5·01
V.	Bishops Cannings	2·27	,,	Perth, Pitcullen House	3·04
,,	Ashburton, Druid House	5·67	,,	Coupar Angus Station	3·34
,,	Okehampton, Oaklands	4·20	,,	Blair Atholl	2·90
,,	Hartland Abbey	3·08	,,	Montrose, Sunnyside Asylum	5·73
,,	Lynmouth, Rock House	3·28	XVII.	Alford, Lynturk Manse	4·55
,,	Probus, Lamellyn	2·27	,,	Keith Station	2·98
,,	Wellington, The Avenue	...	XVIII.	N. Uist, Lochmaddy	3·24
,,	North Cadbury Rectory	1·58	,,	Alvey Manse	1·69
VI.	Clifton, Pembroke Road	2·61	,,	Loch Ness, Drumnadrochit.	2·09
,,	Ross, The Graig	2·26	,,	Glencarron Lodge	3·92
,,	Shifnal, Hatton Grange	3·18	,,	Fearn, Lower Pitkerrie	2·49
,,	Cheadle, The Heath House.	3·72	XIX.	Invershin	3·79
,,	Blockley, Upton Wold	2·78	,,	Altnaharra	2·44
,,	Worcester, Boughton Park.	2·74	,,	Bettyhill	2·05
VII.	Market Overton	4·14	XX.	Dunmanway, The Rectory	6·27
,,	Market Rasen	2·95	,,	Cork	3·58
,,	Bawtry, Hesley Hall	3·16	,,	Darrynane Abbey	4·00
VIII.	Neston, Hinderton Lodge	2·79	,,	Glenam [Clonmel]	3·44
,,	Southport, Hesketh Park	3·23	,,	Ballingarry, Gurteen	2·58
,,	Chatburn, Middlewood	3·80	,,	Miltown Malbay	3·14
,,	Cartmel, Flookburgh	5·29	XXI.	Gorey, Courtown House	4·18
IX.	Langsett Moor, Up. Midhope	5·48	,,	Moynalty, Westland	4·41
,,	Scarborough, Scalby	3·54	,,	Athlone, Twyford	2·78
,,	Ingleby Greenhow	3·58	,,	Mullingar, Belvedere	3·53
,,	Mickleton	3·38	XXII.	Woodlawn	4·10
X.	Bardon Mill, Beltingham	3·91	,,	Westport, Murrisk Abbey	...
,,	Ewesley, Fallowlees	4·65	,,	Collooney, Markree Obsy.	4·24
,,	Ilderton, Lilburn Cottage	3·82	,,	Mohill	4·42
,,	Keswick, York Bank	4·86	XXIII.	Enniskillen, Portora	3·55
XI.	Llanfrechfa Grange	3·69	,,	Warrenpoint, Summer Hill.	2·72
,,	Treherbert, Tyn-y-waun	4·87	,,	Banbridge, Milltown	3·47
,,	Carmarthen, The Friary	3·59	,,	Belfast, Springfield	4·09
,,	Castle Malgwyn [Llechryd].	3·77	,,	Bushmills, Dundarave	3·97
,,	Plynlimon	5·95	,,	Stewartstown, The Square	4·03
,,	Tall-y-llyn	...	,,	Killybegs	4·84
,,	New Radnor, Ednol	4·06	,,	Horn Head	4·52

METEOROLOGICAL NOTES ON MAY, 1907.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Temp. for Temperature; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; TS for Thunderstorm; R for Rain; H for Hail; S for Snow.

LONDON, CAMDEN SQUARE.—A normal month in most respects. The temp., although the mean was 54°·3, or 0°·3 above the average, was as a rule low, except during short periods in the second and fourth weeks. Polar winds rather preponderated and the amount of cloud was abnormally large. Duration of sunshine 137·0* hours, and of R 35·9 hours.

CROWBOROUGH.—A wet month, the R being ·84 in. above the average of 36 years, reducing the deficiency during 1907 to ·15 in. The month opened with boisterous, cold and unsettled weather till 4th, and cold and warm periods alternated throughout. Severe TS from 8.30 to 11 p.m on 25th. Mean temp. 51°4.

BURY ST. EDMUNDS.—Very wet; the R had been exceeded only twice in May during 50 years.

NORTH CADBURY.—Excessively cloudy and rather windy. The day temp. was somewhat low but the nights were too cloudy to be cold. It was rainy but not wet.

COVENTRY.—A remarkable R began at about 10 p.m. on 13th, lasting continuously for 43 hours: total 2·78 in. We only just escaped a heavy flood.

SOUTHPORT.—Very dull and decidedly wet, with an exceptional prevalence of easterly winds, sea breezes being largely in defect. There were frequent trying changes of temp., but the mean, 50°·7 was only 0°·4 below the average. Duration of sunshine 151·5* hours, or 61 hours below the average. R 1·13 in. above the average. Duration of R 78·0* hours.

BOLTON.—Except for short intervals the temp. was much below the average, the mean being 48°·6, or 0°·8 below. R was decidedly in excess and the largest in May since 1886. Duration of sunshine, 99·7* hours, or 47·1 hours below the average. The wind during a great part of the month was from the E.

HAVERFORDWEST.—Wet and stormy till 11th, then fine, but cold throughout and vegetation backward. Duration of sunshine 170·7* hours.

DOUGLAS.—If May, 1906, could be describable as "deplorable," May, 1907, deserves a stronger condemnation—it was execrable! Beginning with a continuance of a N.W. gale of over 70 hours' duration, cruelly blackening young foliage and fruit blossom, it was exceptionally windy throughout. R daily till 12th, often heavy and always cold, followed by a week of fine though cold weather, then excepting four warmer and calm days from 24th to 27th, it was again wet and gloomy with bitter E. winds to the end.

COUPAR ANGUS.—R 1·27 in. above the average. Mean temp. 46°·3, or 2°·0 below the average.

DRUMNADROCHIT.—Remarkably cold with E. or N. wind. Frosts on several nights and new S frequently on the higher hills. R ·04 in. below, and rain days equal to, the average.

CASTLETOWN.—Except a few days from 8th to 14th and again from 24th to 26th, the month was harsh and cold with prevailing N.E. and E. winds.

DUNMANWAY.—Very wet for May, especially in the first fortnight and the last three days; from midnight on 28th to 10 a.m. on 31st it rained with scarcely a break. From 14th to 24th was dry and cold with night frosts, but 27th and 28th were very hot.

MILTOWN MALBAY.—Icy gales with H and R prevailed till 15th, thence to 21st was frosty, dry and cold. More genial with a spurt in vegetation till 27th, but cold and rainy at the end.

DUBLIN.—Cold, generally cloudy and cheerless. N.E. and E. winds predominated. R fell to the amount of 2·52 in. on the first 12 days, of which 1·12 in. fell in a TS on 6th. Mean temp. 51°·4, or 0°·7 below the average.

BANBRIDGE.—R 1·47 in. above the average of 45 years.

* Campbell-Stokes.

Climatological Table for the British Empire, December, 1906.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Date.	Absolute. Minimum. Temp.	Date.	Average. Max.	Min.	Dew Point.	Humidity.	Absolute. Max. in Sun.	Max. on Grass.	Total Rain. Depth.	Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
London, Camden Square	55·1	3	20·9	27	42·0	32·9	35·4	90	76·0	17·7	2·21	19	...
Malta	...	...	...	...	...	...	...	...	...	...	...	...	...
Lagos	94·0	7	71·0	27	87·7	74·9	75·4	81	150·0	68·0	·58	2	6·1
Cape Town	92·3	6	50·5	22	75·0	58·1	54·8	68	...	...	3·23	10	4·9
Durban, Natal ...	89·3	4	60·3	7	81·5	66·0	...	...	154·3	...	6·96	19	5·9
Johannesburg	79·8	20	47·0	2	72·8	53·3	51·8	72	154·8	44·5	4·59	16	5·4
Mauritius	88·9	18	65·1	19	84·7	69·5	65·3	69	152·3	57·1	4·52	14	6·6
Calcutta...	82·3	13	52·7	23	78·2	58·0	57·0	70	143·5	45·6	·00	0	3·5
Bombay...	91·1	9	69·3	15	86·3	71·3	65·8	67	136·4	59·9	·00	0	0·7
Madras	84·9	23	63·4	3	81·6	71·4	70·5	85	135·4	58·0	16·43	13	6·3
Kodaikanal	67·8	4	43·6	12	60·4	48·3	47·7	81	135·2	30·6	6·19	18	6·6
Colombo, Ceylon ...	90·6	22	70·2	27	86·1	73·2	71·7	81	150·0	66·2	1·91	12	4·8
Hongkong	78·4	21	50·3	26	68·9	59·6	54·2	70	130·2	...	·66	4	4·9
Melbourne	96·8	22	44·3	26	75·6	53·6	51·0	65	155·0	35·0	·74	7	5·5
Adelaide	108·7	9	43·0	4	83·8	59·6	51·0	48	161·0	41·6	1·54	5	3·9
Coolgardie	105·8	6	51·0	24	91·6	62·6	49·2	53	175·0	49·2	·25	3	2·8
Sydney	89·9	17	55·0	27	76·8	62·4	58·4	64	131·2	46·1	1·61	14	4·9
Wellington	69·3	31	46·2	30	65·2	54·1	49·2	68	138·0	36·0	1·14	7	3·5
Auckland	...	...	...	..	...	...	...	...	...	...	...	...	...
Jamaica, Negril Point.	88·9	10	64·3	26	83·7	68·9	65·2	69	...	...	·10	1	...
Trinidad	...	...	...	...	...	...	...	...	...	...	...	...	...
Grenada	85·4	11	70·8	22	83·0	73·0	74·1	84	146·2	...	7·40	21	3·4
Toronto	43·9	31	-8·1	8	29·8	15·2	21·4	86	56·8	-15·0	1·54	5	7·3
Fredericton	43·2	22	-24·3	10	24·7	6·0	...	81	...	...	1·51	4	6·0
St. John's, N.B. ...	49·8	21	-9·3	9	32·0	15·2	...	82	...	...	3·05	11	6·4
Victoria, B.C.	52·5	22	28·3	27	45·1	37·4	...	93	...	...	3·82	18	8·3
Dawson	8·0	26	-55·0	5	-17·4	-27·1	...	...	...	...	·00	0	5·2

Johannesburg.—Rainfall above the average.

Mauritius.—Mean temp. of the air 1°·7, dew point 2°·3, relative humidity 1·8 per cent., and R ·37 in. below, averages. Mean hourly velocity of wind 10·0 miles, or 0·8 below average.

MADRAS.—R over three times the normal for the month, and on the 13th more than 4 inches fell in 24 hours. T8 on one day. Bright sunshine 124·3 hours.

KODAIKANAL.—Bright sunshine 129 hours. A stormy month.

COLOMBO.—Mean temp. of air 79°·4, or 0°·2 above, of dew point 0°·8 above, and R 3·86 in. below, averages. Mean hourly velocity of wind 7·6 miles.

HONGKONG.—Mean temp. of air 63°·5. Bright sunshine 194·4 hours. Mean hourly velocity of wind 11·8 miles.

Adelaide.—Mean temp. of air 0°·3 above, and R ·71 in. above, averages.

Sydney.—Mean temp. of air 0°·3 above, and R ·88 in. below, averages.

Wellington.—R 1·90 in. below the average, a dry and sunny month.

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Alexander Buchan.

Kinnesswood, 11th April, 1829—Edinburgh, 13th May, 1907.

The death of the leading British meteorologist deprives our science of one of the few survivors of the great formative period of modern meteorology, and takes from the workers in that subject an honoured master and a trusty friend. We, ourselves, owe much to the example and teaching of Dr. Buchan in observing and discussing the records of meteorological instruments, and more to the constant inspiration of his example and his kindly encouragement.

Alexander Buchan was born in Kinnesswood, Kinross, on 11th April, 1829, and was educated at the Free Church Normal School, in Edinburgh, and afterwards at the University, where he took the degree of M.A., in 1864. From 1848 onwards he followed the profession of a teacher, for which indeed he was naturally gifted, and throughout his life he retained the power of imparting instruction easily and pleasantly. As a schoolmaster he filled appointments at Banchory, Blackford, and lastly at Dunkeld. But for a weakness in the throat that continued to trouble him through life he might never have relinquished the profession he had chosen.

The Scottish Meteorological Society was founded in 1856, but though its early records give full particulars of the qualifications, appointment and withdrawal of several successive secretaries, curiously enough nothing is said in the published minutes of the appointment of Mr. A. Buchan, who read his first paper as Meteorological Secretary at the meeting of 11th April, 1861. The subject was "The cold weather of the previous Christmas." It is interesting to observe that even at this early period he treated the problem in a distinctly geographical manner, and he called attention to a fact, the importance of which he often referred to afterwards, the remarkable difference in the distribution of low temperatures according to the configuration of the surrounding land surface.

It was the custom for the Council of the Scottish Meteorological Society at that time, and for many years afterwards, to select a certain subject for investigation and report by the Meteorological Secretary, whose studies were thus guided by a body of learned and sagacious men of science and affairs. Guided in this way from 1861 onwards, Dr. Buchan was nearly as much the author as the

editor of the Journal of the Scottish Meteorological Society, the "new series" of which was started in 1862. It was the period of most rapid advance in meteorology, the principles of the synoptic weather chart, of the relation of wind direction to the isobars, and of scientific forecasts of the weather for short periods had just been enunciated, and thanks, in part to the early interest of Mr. D. Milne Home, of Milne Graden, in the Dutch weather forecasting experiments, and in part to the enthusiasm with which Buchan took the matter up in those early years, the name of Buys Ballot and the extension of the relation between barometric gradient and wind direction were soon thoroughly familiar in this country. In 1867 he published his "Handy Book of Meteorology," a second edition of which appeared in the following year. This book showed so firm a grasp of the principles of the science, and so thorough a mastery of observational detail, that it became the standard text-book in the language; and in later years many appeals were made to the author to bring it up to date. The increasing volume of official work and the burden of various important researches was such that the appeals had to be made in vain. Following on the larger work an "Introductory Textbook of Meteorology" was issued in 1871.

In 1869 Mr. Buchan read to the Royal Society of Edinburgh the paper by which his reputation as a leader in meteorology was established at once and for ever throughout the world. It dealt with the difficult and baffling problem of charting the mean distribution of atmospheric pressure and prevailing winds over the globe. This paper was perhaps the most fruitful, though it was far from being the most laborious piece of work which Dr. Buchan accomplished. A natural result was that on the return of the *Challenger* expedition in 1876, the vast mass of meteorological data accumulated in every part of the world was handed over to Dr. Buchan to report upon. He was able to prepare as the basis of his "Report on Atmospheric Circulation," published in 1889, maps of the world representing the mean temperature, and also the mean barometric pressure and wind directions for every month as well as for the year. These were prepared in pairs for each month, one map showing the whole world on a projection modified from Mercator's, the other showing the northern hemisphere down to about latitude 30° N., on a much larger scale. His last work on terrestrial meteorology was the editorship of the volume on Meteorology in Bartholomew's great "Physical Atlas," in which he was aided by Dr. A. J. Herbertson.

Climatology, that department of meteorology which is equally a department of geography, always claimed the lion's share of Dr. Buchan's attention. He worked as much with maps as with tables of figures, and it is to his patient labours that we are indebted for the first discussion of the monthly distribution of pressure and temperature over the British Isles. The subject frequently attracted

him in later years, and there are several valuable papers dealing with it in his "Journal."

The relation of climate to disease occupied his attention, and was dealt with in several papers written jointly with Sir Arthur Mitchell, one of the founders of the Scottish Meteorological Society.

In 1883 two important enterprises engaged the attention of Dr. Buchan and the other leading men interested in the study of natural phenomena in Edinburgh; one of these was the establishment of the Scottish Marine Station at Granton; and the other was the foundation of the observatory on the summit of Ben Nevis, and subsequently of a second observatory at Fort William. For the remainder of his life the meteorology of Ben Nevis unquestionably held the first place in Dr. Buchan's scientific work. He took his share in the efforts to awaken public interest and secure the necessary funds to start the observatories, and to carry them on, and he put forth more energy than was perhaps prudent from the point of view of health in the effort to persuade an indifferent Government to place the work on a permanent basis. Many references have been made in this Magazine to the unsuccessful struggle to secure public money for the maintenance of the Ben Nevis observatories, and we do not propose to dwell on it now. Dr. Buchan's old friend and colleague on Ben Nevis, Mr. R. T. Omond, has kindly sent a valuable note on the subject.

While Dr. Buchan was particularly associated throughout his long and active life with the scientific activity of Scotland, and of Edinburgh in particular, he was also well known in London, where he had a place on several important representative bodies. For many years he was the representative of the Royal Society of Edinburgh on the committee, nominated for the most part by the Royal Society of London, for the administration of the Government grant of £4000 per annum for scientific research. In 1887 he was appointed a member of the Meteorological Council, the body which, on the responsibility of the Royal Society of London, directed the Meteorological Office and administered the sum set apart by Parliament for the meteorological service of the country. He became a Fellow of of the Royal Society in 1898. Dr. Buchan frequently attended the meetings of international committees, and was on terms of personal friendship with all the leading continental meteorologists.

When the Symons Memorial Gold Medal was founded, the Royal Meteorological Society made the first award to Dr. Buchan as the most eminent British meteorologist.

Dr. Buchan received the honorary degree of LL.D. from the University of Glasgow in 1887. He was a member of the Council of the Royal Society of Edinburgh for nearly forty years, and he received in turn the Makdougall Brisbane and the Gunning prizes of the Society. In connection with the Edinburgh Royal Society Club, Dr. Buchan shone in a sphere with which many to whom he was familiar in the streets and in his office never associated him,

as purveyor of intellectual gaiety of the old Scottish type. As a host Dr. Buchan was always charming, and his breakfasts on the occasion of such meetings as those of the British Association are not to be forgotten by any one who had the privilege of taking part in them. The first Meteorological Breakfast at the British Association was given by Mr. D. Milne Home in 1871, and the function was continued by Mr. Symons for several years. When we revived the Meteorological Breakfast at Glasgow in 1901 we were fortunate in securing Dr. Buchan as chairman, and on that occasion he gave a short speech full of the memories of the great exponents of meteorology who had graced those meetings in the past.

We cannot close these notes without a tribute to the memory of Miss Jessie Hill Buchan, the faithful niece and invaluable assistant who worked for so many years in the office with her uncle.

In private life Dr. Buchan was full of surprises to those who expect to find a student of science a man of one idea. He took a deep interest in church matters, and was an elder in Free St. George's. He revelled in poetry, especially in the old Scottish ballads, from which on suitable occasions he could produce singularly apt quotations, and his knowledge of literature was remarkable when one remembers the laborious and engrossing nature of his never-ceasing work.

DR. ALEXANDER BUCHAN AND THE BEN NEVIS OBSERVATORIES.

By R. T. Omond.

When the Meteorological Observatory on Ben Nevis was established as a permanent station with resident observers in 1883, Dr. Buchan drew up the scheme of observations, which was adhered to throughout the whole time the Observatory was in existence as a scientific institution. With characteristic thoroughness he insisted on the necessity of a complete hourly record of the chief meteorological elements—such as pressure, temperature, wind, rainfall, etc.—even though it were necessary to get these by "eye" readings when self-recording instruments would not work. As the ever growing record of these observations came in, he dealt with them in the same systematic and masterly manner which in former years he had shown in his great discussions of the atmospheric pressures and temperatures of the world.

The foundation of this work was his comparison of the barometric pressure on the summit of Ben Nevis with that at sea level, first for general average values and then for individual hourly readings from day to day. This was quite a new method of treating high level observations, and has not I believe been carried out elsewhere except to some extent in respect to the high level stations in India. It is a

method which can only be used for fixed mountain stations; the barometric traces got from kites and balloons are useless for such a discussion because with them the exact height above sea level of the instrument recording the pressure is not known. He showed the intimate connection between pressure and temperature at the high and low level stations and how this varied with the weather conditions at the two places. Some of the results of his investigations are given in the appendices to the volumes of Ben Nevis observations in the Transactions of the Royal Society of Edinburgh, but these papers were only introductory; Dr. Buchan hoped to be able to develop this line of research further, but it was not so to be, and the future investigation of the Ben Nevis record must be carried on by others building on the foundations laid by Dr. Buchan.

THE TEMPERATURE OF JUNE, 1907.

It is possibly some small compensation for enduring so inclement a period as the past spring and early summer, that the meteorologist should experience the mild excitement afforded by the comparison of his observations with those of previous years, and entertain the reasonable expectation of being able to establish a new "record" to carry down into the future.

During the month of June the British Isles came under the influence of a series of shallow depressions advancing from the Atlantic in a north-easterly direction, and following one another in rapid succession. Except in the north of Scotland there was, in consequence, an unusual tendency towards westerly and south-westerly winds, which were constantly accompanied by cloudy skies and frequent rain. The temperature for the month was below the average everywhere in the United Kingdom, falling short on the whole by about 2°·5. The deficiency increased fairly uniformly from east to west in Great Britain, exceeding 3° in the western half of Scotland, the whole of Wales, and many parts of the west of England. The most serious deficiencies occurred in the western Highlands and in the south of Wales, where the mean temperature was probably more than 4° in defect over considerable areas. Only in the extreme east of Great Britain and north of Scotland did the temperature rise to within 2° of the average, and several coast stations in Yorkshire and East Anglia approached to within 1° of the normal.

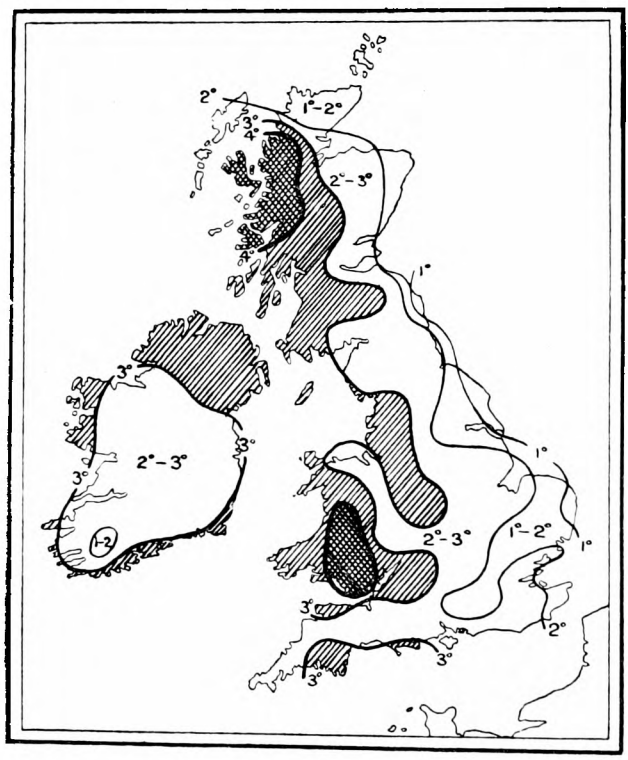
In Ireland the general temperature was about 3° below the average; the inland stations were comparatively less cold than the coast stations. At Killarney only was the deficiency less than 2°.

The map which is reproduced herewith shows by the increasingly dark shading the increasingly low temperatures in June, expressed by the number of degrees below the average for each locality.

During the first week practically no instances of shade maxima exceeding 70° were reported in the British Isles, and at a large

majority of stations the average maximum failed to reach 60°. The minima were on the whole less remarkable, and only fell below 40° in Scotland and a few stations in the north of England. The temperature was normal or slightly above the average during the second week, but the day temperatures were in most places remarkably moderate. The last fortnight was everywhere extremely cold, with no maxima exceeding 70°, and a considerable number of instances of ground frost. The lowest shade minimum reported was 32° at Balmoral.

TEMPERATURE OF JUNE, 1907.
NUMBER OF DEGREES BELOW THE AVERAGE



The shaded area had a deficiency of more than 3°, the cross shaded area more than 4°.

The temperature conditions in London, although sufficiently noteworthy to call for comment, were less severe than in most parts of the Kingdom, and the table below of the readings at Camden Square shows that the mean temperature has been lower in June on 6 occasions during the past half century. It should be noted that the extremes quoted for the Glaisher screen are not strictly comparable with observations taken in the standard Stevenson screen in use at

the majority of observing stations. The readings in the Stevenson screen are therefore added, but the Glaisher screen readings alone are compared with averages.

Temperature at Camden Square, June, 1907.

	June, 1907.	Difference from Aver., 1858-1897.	Number of times lower, 1858-1906.
	°	°	
Mean Shade Max. .....(Glaisher)...	67·0	—4·3	3
,, ,, ,, ...(Stevenson)	65·9	...	...
,, ,, Min. .....(Glaisher)...	50·4	—0·5	17
,, ,, ,, ...(Stevenson)	51·5	...	...
,, ,, Temp. .....(Glaisher)...	58·0	—2·4	6
Extreme Shade Max. .....(,,)...	78·0	—5·1	7
,, ,, ,, ...(Stevenson)	75·6	...	...
,, ,, Min. .....(Glaisher)...	43·9	+2·1	40
,, ,, ,, ...(Stevenson)	45·2	...	..
,, Sun Max. (black)	123·8	—5·7	...
,, Grass Min.	39·9	+3·1	...

THE DINNER OF THE ROYAL METEOROLOGICAL SOCIETY.

THE annual dinner of the Society was held in the Trocadero Restaurant, on the evening of Tuesday, 18th June, Dr. H. R. Mill, President, in the chair. There were present about ninety gentlemen, including a number of distinguished guests. The company included the Norwegian Minister, Dr. Fridtjof Nansen, the Right Hon. Sir George Taubman Goldie, President of the Royal Geographical Society, Sir Richard Douglas Powell, Bart., President of the Royal College of Physicians, Sir Richard Biddulph Martin, Bart., Prime Warden of the Fishmongers' Company, Sir Norman Lockyer, K.C.B., Sir Thomas Elliott, K.C.B., Secretary to the Board of Agriculture, Sir John Murray, K.C.B., Sir Lauder Brunton, Professor Otto Pettersson, of Stockholm, Hon. W. Pember Reeves, High Commissioner for New Zealand, Professor J. Perry, Mr. E. H. Shackleton of the British Antarctic Expedition, Dr. J. Scott Keltie, Mr. J. Wrench Towse, Mr. Günther, Mr. A. Watt, Secretary of the Scottish Meteorological Society, Mr. R. A. Gregory, Dr. C. Theodore Williams, Mr. F. Campbell Bayard, Mr. H. Mellish, Dr. R. H. Scott, Captain D. Wilson-Barker, Mr. Richard Bentley, Mr. W. Ellis, Dr. W. N. Shaw, Captain Campbell Hepworth, Mr. D. W. Freshfield, Mr. Baldwin Latham, Mr. F. Druce, Rev. H. A. Boys, Major B. Baden-Powell, Rev. Wm. Esdaile, Mr. R. G. K. Lempfert, Mr. J. A. Curtis, Mr. R. H. Curtis, Captain Clarke, Mr. R. Inwards, Mr. Harries, and Mr. W. Marriott.

During the evening songs of appropriate character were interspersed with the speeches, the musical arrangements being under the personal direction of Mr. H. Schartau. Amongst the songs were "The Stormy Winds do Blow," "The Rain it raineth every day," "Haste ye Soft Winds to my relief," and "The long day closeth." A flash-light photograph was taken in the course of the evening.

After the Royal toasts had been honoured, Dr. Nansen proposed "The Royal Meteorological Society," in an eloquent speech, in which he laid stress on the lofty ideal which should be kept in view by every scientific society, the pursuit of knowledge for its own sake, irrespective of its immediate utility. The Chairman, in responding, said that the Society was prosperous and growing in numbers, harmonious in its domestic relations between Fellows and Council, and fraternally disposed towards co-operation with all other bodies pursuing kindred studies. While the main aim of the Society was always the advancement of the science of meteorology, the humbler needs of the applications of the science to the affairs of the fisherman, farmer, and the general public, were not ignored.

Dr. C. Theodore Williams, Treasurer of the Society, proposed "Kindred Institutions," referring to the large number of interests with which meteorology came in contact. Sir George Goldie replied on behalf of other learned societies, dwelling on the close kinship between meteorology and geography. Dr. W. N. Shaw, Director of the Meteorological Office, replied on behalf of official meteorologists. He paid a graceful tribute to the services to science of the late Dr. Buchan, and to the fruitful labours of such veteran workers as Sir Richard Strachey and Mr. Francis Galton, and he did not forget the great army of volunteer observers who accumulate the data for specialists to study.

Mr. Richard Bentley proposed "The Visitors," referring to the wide range of the Earth from which they had come, from the close neighbourhood of the north pole and of the south, and to the vast variety of the interests—all kindred to the science of the weather—which they represented. Sir John Murray, of the *Challenger* expedition, and Sir Thomas Elliott, replied, the latter expressing the keen appreciation of the relation between meteorology and agriculture felt by the Board of Agriculture and Fisheries.

The toast of "The Chairman," proposed by Mr. F. Campbell Bayard, and briefly acknowledged, terminated the proceedings.

It was felt generally that the dinner had passed off pleasantly, and the distinguished visitors being scattered amongst the Fellows and not concentrated together, as is not unusual on such occasions, the body of the Fellows present was able to play its part of host, and to enjoy to the full the society of the guests.

Correspondence.

To the Editor of Symons's Meteorological Magazine.

SUMMER SNOW AND FROST: CLIMATIC VAGARIES.

COL. CHRYSTIE'S note of snow on June 3rd, at Farnham, Surrey, reminds us of some past experiences suggesting that there is no month of the year in which snow and frost are not possible in England.

On July 11th, 1888, in the early morning a few flakes of snow fell at Bristol, and the newspapers stated that on the same morning at Shepton Mallet, Somerset, the ponds were covered with a thin coating of ice! For the day named I recorded a mean temperature of 49°, the minimum at 4 ft. being 40°·5 and there was a slight grass frost.

In the Registrar General's Reports snow was stated to have fallen heavily in 1888 on the night of June 10th, in Scotland, the depth being 6 inches. On July 10th snow was observed at Keswick, and on July 11th snow showers occurred in north and east Derbyshire where the weather was so bad that the harvest had to be suspended.

During the very inclement summer of 1879, snow fell on July 4th and 8th at Bolton and on July 9th at Cockermouth. In 1883, on July 15th snow fell at Whitchurch; other instances might be quoted.

Looking back through my old meteorological records I find some interesting evidence as to the vagaries of our climate. Thus on July 14th, 1876 and July 11th, 1888, I registered mean temperatures of 50°·6 and 49°·0, whereas on December 28th, 1876 and December 6th, 1889, I obtained 55°·0 and 54°·9.

The great heat of the summer of 1876 was terminated on Saturday, August 19th, by very heavy thunderstorms which occurred during the afternoon and night. At 9 a.m. on August 20th I measured 3·570 inches of rain in my gauge. Yet, after the intense heat of previous weeks there was a slight frost on the grass here on the early morning of August 25th in some situations, though my terrestrial radiation thermometer did not fall below 32°·6.

At Ashley Down, Bristol, where nearly all my observations were taken, I found May frosts, often very severe. Thus on May 5th, 1877, the shade minimum was 26°·8, and the grass minimum 20°·4.

On March 19th, 1867, and March 15th, 1887, snow lay on the ground here to the depths of 13 and 16 inches respectively. Yet March 16th, 1884 was a perfectly summerlike day, with a maximum temperature of 67°.

W. F. DENNING, F.R.A.S.

Bishopston, Bristol, June 19th, 1907.

P.S.—The *Daily Mail* of June 27th contained the following:—

"There was the unique experience last evening, June 26th, of a snow and hail storm of nearly an hour's duration on the eastern range of the Lammermoor Hills, which for a short time were almost totally mantled in white."—W. F. D.

RAPID FORMATION OF FOG AND GLOOM.

I SUSPECT that a bank of London smoke was the cause of the phenomenon described on p. 53. I have several times seen the same phenomenon here when the wind has been from the direction of London, though this place is 36 miles off as against Epsom's 16.

ALFRED O. WALKER.

Ulcombe Place, 17th April, 1907.

THE DRY FIRST QUARTER OF 1907.

IN an unbroken period of 21 years of meteorological work here, I have had no precedent of such a dry three months as January, February and March; rain only falling on 28 days out of the 90, with a total of 3·16 in., being a little below the half of the average amount. This is true even though February, 1890, had only rain on 6 days, and February, 1891, none at all. W. G. MACHIN.

Hartley Wintney.

MAXIMUM AND MINIMUM TEMPERATURES.

THE kind of difficulty mentioned by Mr. H. E. Wood, p. 72, in your May issue, is, I consider, a still greater one as regards the minimum temperature. I think the maximum temperature ought to be recorded somewhere about the usual time of minimum, and the minimum somewhere about the usual time of maximum. The general practice with regard to the maximum is sufficiently near this; but many observers record the minimum at 8 or 9 a.m., which in winter in this country is not far from the usual time of minimum, the result being that one minimum is often recorded twice over, which seems unfair. 1 or 2 p.m. would be much fairer for recording the minimum.

T. W. BACKHOUSE.

West Hendon House, Sunderland, 8th July, 1907.

MARCH AND JUNE.

IT may be of interest to note that on March 31st I recorded a maximum reading of 70°·1, the highest in March in my 24 years' record, and apparently the highest recorded in London for 50 years.

The temperature in the month of June just past has only risen to 70° on one day. The absolute maximum (74°·9) and the mean maximum (64°·4) are both the lowest yet recorded here in 24 years, though the mean temperature was a trifle lower in 1903.

The great thunderstorm on the 29th, when 1·22 in. was measured, raised the total rainfall to 2·92 in., otherwise it would have been under average, in spite of the dull and showery weather that has prevailed.

G. VON U. SEARLE.

30, Edith Road, West Kensington, W., 6th July, 1907.

THE INTERMITTENT SUNSHINE OF JUNE, 1907.

IT may possibly be of interest to observe, as characteristic of the month just past, that the total sunshine measured here in June, 170 hours 42 minutes (about 25 hours less than the average), was recorded in upwards of three hundred *separate* traces. There are indications of a still larger number, but those traces which impinge on each other without a distinct interval have not been taken into account. The measurement was by the Campbell-Stokes recorder.

RICHARD BENTLEY.

Upton, Slough, Bucks, July 1st, 1907.

THE COLD JUNE OF 1907.

THE wettest and coldest June I can remember has just come to an end with 5·42 in. of rain falling on 25 days. The heaviest fall was ·84 in. on the 22nd, with thunder and hail. The maximum shade temperature was 65° on the 8th, 11th and 17th; the minimum 39° on the 25th. The thermometer reached 60° on only 15 days. Thunder occurred on the 10th, 12th, 22nd and 28th. The prevailing direction of the wind was S.W. to S.E.

HENRY B. MURRAY.

Ardnaveigh, Antrim, July 1st, 1907.

A FEW facts about the weather experienced at Buxton, the highest meterological station in England, during June, 1907, might be of interest to observers at stations of lower altitude.

The rainfall amounted to 8·10 in., and is the second highest on record, being only exceeded by the fall in 1882, which amounted to 8·42 in. The average rainfall for June is 3·42 in., so that this year's fall is more than double the average. Rain fell on no fewer than 27 days, this constituting a new record; the previous one being 25 days, in June, 1879.

The total duration of bright sunshine, as registered by a Jordan Sunshine Recorder, was 133·2 hours—38·2 hours below the average. During the month five days had no sunshine whatever, and five had under an hour.

The mean temperature was 3°·6 below the average, being 51°·0. The maximum temperature for the month was registered on the 9th, 69°·1, and, with the exception of June 20th, 1879, is the lowest maximum temperature for the month ever experienced in June. Freezing point was not reached once, either in the screen or on the ground.

Severe thunderstorms occurred on the 5th and 9th and thunder alone was heard on the 30th.

FREDK. T. KEILDSEN, JUN.

Lismore House, Buxton, Derbyshire, July 2nd, 1907.

THE following table gives particulars of rainfall and temperature from the writer's observations for the month of June at Belper, Derbyshire, where the rainfall during the 30 years, 1877-1906, exceeded that of June, 1907, on eight occasions :—

	Rainfall in June. in.	Total from Jan. 1—June 30. in.	No. of Rain Days.	TEMPERATURE. Mean max.	Mean min.	Mean.
				°	°	°
1879 ...	6·21	19·24	25	62·3	49·0	55·6
1892 ...	5·09	14·31	18	63·3	47·0	55·2
1891 ...	4·82	15·26	12	64·4	49·4	56·9
1900 ...	4·49	18·31	17	66·3	50·3	58·3
1882 ...	4·13	18·42	19	62·1	47·0	54·6
1883 ...	3·91	15·16	14	63·9	48·0	56·0
1897 ...	3·82	17·91	12	66·8	50·9	58·8
1880 ...	3·58	12·47	17	63·0	48·0	55·5
1907 ...	3·42	14·24	22	60·8	47·6	54·2

Comparison of the Actual Records for June, 1907, with the Means for 30 Years, 1877—1906 :—

	June, Mean 30 years, 1877-1906.	June, 1907.
Rainfall, inches	2·56	3·42
Rain from Jan. 1—June 30	14·10	14·24
Days on which rain fell.....	13	22
Mean temp.	57°·0	54°·2

JOHN HUNTER, A.M.I.C.E., F.R.Met.Soc.

Belper, July 1st, 1907.

TEN "SUMMER" DAYS.

THE ten days ending July 8th, 1907, give the following average temperatures :

9 a.m. temp.....	53°·6	Max. in Stevenson screen..	57°·4
Grass thermometer.....	38°·0	Min. ,, ,, ,, ...	42°·3
One foot below the surface..	52°·7	Mean ,, ,, ,, ...	49°·8
Two feet ,, ,, ...	52°·2	Rainfall, 1·05 inches on 8 days.	

This is by far the most arctic weather we have experienced here in summer since my register began in 1878 ; I have taken out the ten individually coldest days that have occurred in July since that year, and find the mean 49°·5, or only 0°·3 lower than the ten *consecutive* days just passed.

The mean temperature of June, 1907, is less (53°·2) than any year during the same period, while the number of rain days (25) is the greatest, though the rainfall has twice been slightly exceeded.

For the quarter ending June we have had 70 rain days out of 91, with 13·39 inches of rain, an excess of 59 per cent. above the average ; also unequalled for a quarter of a century.

CHARLES L. BROOK.

Harewood Lodge, Meltham, July 10th, 1907.

THE RELATION BETWEEN THE WEATHER OF SPRING AND OF THE FOLLOWING SUMMER.

It is a familiar saying that "a bushel of March dust is worth a king's ransom." The meaning apparently is that with a dry March we may expect a bountiful season. Such a season generally implies, I suppose, a fine, hot summer. We may then usefully compare March, wet or dry (rainfall over or under average), with the heat of the following summer. This heat may be measured by the number of "hot days," or days with a maximum of 80° or more. Of these there are 15 in the year on an average at Greenwich, and the numbers have ranged from 0 up to 40. We take the 66 years, 1841—1906.

It appears that a dry March is followed about equally often by a hot and by a cool summer. But on comparing the hot summers after dry Marches with those after wet Marches, the former are seen to be both more numerous (19 to 9), and to run oftener into higher figures. Consider these two facts :—

1. The five hottest summers of all (hot days in each case over 28) were each preceded by a dry March.

2. Of the 19 hottest summers (20 to 40 hot days), 16 were preceded by a dry March.

I may say that 17 of these 19 were also dry. (In our summers heat and dryness generally go together; in winters, heat and wet. Spring and autumn, being transitional, seem to be neutral in this respect.)

May not a perception of some such relations as the above have been at the genesis of the practical saw about March dust?

The relations of spring and summer are variously interesting. Thus, a cold and wet spring is rarely followed by a hot summer. I find that out of 14 such springs, only 2 were so followed; the hot days then numbering 21 and 17 respectively (average 15). The opposite case (of warm and dry springs) is less pronounced, and the two remaining possible cases seem to be neutral.

With a spring rainfall of 6 inches or more (average 5·1 in.), the prospect of a hot summer would appear to be extremely small.

The seasonal conditions of a good wheat harvest are being ably elucidated by Dr. Shaw. In a recent paper to the *Journal of Agricultural Science* (January, 1907), dealing with 22 years' experience in east England, he considers (from average results) that "a good wheat yield is preceded by a dry and warm autumn, a rather dry and warm winter, a rather wet and cold spring, and a dry and slightly warm summer."

ALEX. B. MacDOWALL.

REVIEWS.

Gesammelte Abhandlungen aus den Gebieten der Meteorologie und des Erdmagnetismus von WILHELM VON BEZOLD. *In Gemeinschaft mit* A. COYM *herausgegeben vom Verfasser. Mit 66 Abbildungen im Text und 3 Tafeln.* [*Collected Memoirs relating to Meteorology and Terrestrial Magnetism, by* WILHELM VON BEZOLD. *Edited by the Author with the co-operation of* A. COYM.] Braunschweig: Friedrich Vieweg und Sohn. 1906. Size 10 × 7. Pp. viii. + 448.

THE last work of the author was the preparation of what is always the best memorial of a man of science—a selection of his best work gathered in from the scattered media of publication, revised and where necessary supplemented by his own hand. To the student it is no small advantage to have between two boards, or, to be exact, between paper covers, a set of memoirs which would otherwise have to be sought for individually through many volumes of Transactions all of which are to be found only in a very few libraries. Indeed, the author allows in his preface that he acceded to the request of the publishers largely because his more strictly scientific works were so difficult of access that they were scarcely known except in the form of inadequate abstracts.

There are altogether twenty papers reproduced in the volume, sixteen relating to meteorology and four to terrestrial magnetism. The former, with dates of publication and number of pages are:—

Observations on Twilight. (1864, pp. 34).

On regular variations in the frequency of thunderstorms. (1874, pp. 25).

On an approximately 26-day periodicity in thunderstorms. (1888, pp. 11).

On the increase in the danger from lightning during the last 60 years. (1899, pp. 12, with supplement, 1906, pp. 8).

On the Thermodynamics of the Atmosphere. Part I. (1888, pp. 37).

Ditto. Part II. Potential Temperature. Vertical Temperature Gradient. Compound Convection. (1888, pp. 17).

Ditto. Part III. Mixing of Air. Formation of Cloud and Precipitation. (1890, pp. 39).

Ditto. Part IV Supersaturation and Over-cooling. Thunderstorm formation. (1892, pp. 32).

Ditto. Part V. The climatological importance of the study of ascending and descending air-currents. (1900, pp. 5).

Theoretical considerations on the results of scientific ballooning. . . . . (1900, pp. 44).

On the working up of the humidity data obtained by balloons. 1894, pp. 9).

On the temperature changes in ascending and descending air-currents. (1898, pp. 10).

On the Theory of Cyclones. (1890, pp. 22).

On the representation of pressure distribution by pressure surfaces and by isobars (1901, pp. 10).

The exchange of heat on the Earth's surface and in the atmosphere. (1892, pp. 41).

On climatological means for whole parallels of latitude. (1901, pp. 14).

METEOROLOGICAL NEWS AND NOTES.

A SPECIAL ASSISTANT is required in the Meteorological Office whose duties will be mainly with scientific investigation. He will be expected, in the first instance, to carry out investigations with reference to forecasts of weather, and he must be prepared to attend at the Office from the morning hours of observation at the reporting stations (8 a.m. or possibly 7 a.m.) when required. He will also be called upon for some secretarial work, and for assistance as regards University lectures, or in other ways at the Director's discretion. The appointment will date from October 1st, 1907, and will be in the first instance, for a year on probation at a salary of £250. An adequate knowledge of physics (theoretical and experimental) as well as of mathematics is essential. Applications, with references, should be addressed to the Director, Meteorological Office, 63, Victoria Street, S.W.

PROFESSOR W. J. VAN BEBBER has, we are informed, retired from his position as Departmental Head in the Deutsche Seewarte at Hamburg.

THE INTERNATIONAL COUNCIL FOR THE STUDY OF THE SEA met this year in London, during the week from June 9th to 15th. The meetings of the constituent committees took place in the rooms of the Royal and Linnean Societies; the formal meetings of the Council were in the Foreign Office. It was decided to carry on the international co-operation for one year more, to July, 1908, and to prepare a comprehensive report on the hydrographical, biological and statistical work accomplished in the five years of the Council's activity. His Majesty the King received the Council and experts at Buckingham Palace, on the afternoon of the 14th. Lord Carrington, President of the Board of Agriculture and Fisheries, and Mr. Sinclair, Secretary for Scotland, gave dinners, and so did the Lord Mayor, the Worshipful Company of Fishmongers, and the Royal Geographical Society and Geographical Club. On the 15th Dr. and Mrs. H. R. Mill gave a garden party, with some novel features, at Mill Hill, and the meeting terminated with a lunch in Christ's College, Cambridge, at the invitation of Mr. A. E. Shipley, Chairman of the Council of the Marine Biological Association.

A NOVELIST'S OBSERVATION on rainfall measurement was brought to our notice the other day by a German professor whose habits of wide reading lead him far beyond his native language. The reference is to Anthony Hope's "Dolly Dialogues" :—

"By Jove!" remarked Archie, coming up behind us, pipe in mouth, "there was a lot of rain last night. I've just measured it in the gauge."

"Some people measure everything," said I, with a displeased air. "It is a detestable habit."

TEMPERATURE FOR JUNE, 1907.

STATION.	COUNTY.	Lat. N.	Long. W. [*E.]	Height above Sea. ft.	TEMPERATURE. Max. °	Max. Date.	Min. °	Min. Date.	No. of Nights at or below 32° Shade.	Grass.
		° ′	° ′							
Camden Square	*London*	51 32	0 8	111	78·0	9	43·9	17	0	0
Tenterden	*Kent*	51 4	*0 41	190	73·5	9	41·5	17	0	0
West Dean	*Hampshire*	51 3	1 38	137	76·0	17	41·0	17, 30	0	...
Hartley Wintney	,,	51 18	0 53	222	74·0	9†	38·0	17‖	0	...
Hitchin	*Hertfordshire*	51 57	0 17	238	...	...	...	...	...	...
Winslow (Addington)	*Buckinghamshr.*	51 58	0 53	309	74·0	9	42·0	17¶	0	0
Bury St. Edmunds (Westley)	*Suffolk*	52 15	*0 40	226	73·0	9	39·5	17	0	...
Brundall	*Norfolk*	52 37	*1 26	66	73·8	9	44·0	7	0	0
Winterbourne Steepleton	*Dorset*	50 42	2 31	316	...	...	...	...	...	...
Torquay (Cary Green)	*Devon*	50 28	3 32	12	64·9	16	45·0	29	0	0
Polapit Tamar [Launceston]	,,	50 40	4 22	315	63·9	4	37·5	29	0	0
Bath	*Somerset*	51 23	2 21	67	73·0	9	43·0	29	0	...
Stroud (Upfield)	*Gloucestershire*	51 44	2 13	226	73·0	9	46·0	2	0	...
Church Stretton (Woolstaston)	*Shropshire*	52 35	2 48	800	71·5	9	32·0	3	1	...
Coventry Kingswood	*Warwickshire*	1 30	52 24	340	73·0	9	42·0	2	0	...
Boston	*Lincolnshire*	52 58	0 1	25	75·0	9	46·0	3	0	0
Worksop (Hodsock Priory)	*Nottinghamshire*	53 22	1 5	56	74·6	9	39·1	30	0	2
Derby (Midland Railway)	*Derbyshire*	52 55	1 28	156	...	..	...	...	...	...
Bolton (Queen's Park)	*Lancashire*	53 35	2 28	390	73·9	9	40·6	25	0	0
Wetherby (Ribston Hall)	*Yorkshire, W.R.*	53 59	1 24	130	...	...	...	...	...	...
Arncliffe Vicarage	,, ,,	54 8	2 6	732	...	...	...	...	...	...
Hull (Pearson Park)	,, *E.R.*	53 45	0 20	6	71·0	9	40·0	4	0	...
Newcastle (Town Moor)	*Northumberland*	54 59	1 38	201	...	...	...	...	...	...
Borrowdale (Seathwaite)	*Cumberland*	54 30	3 10	423	71·6	9	40·3	29	0	...
Cardiff (Ely)	*Glamorgan*	51 29	3 13	53	...	...	...	...	...	...
Haverfordwest (High Street)	*Pembroke*	51 48	4 58	95	65·1	...	40·0	...	0	...
Aberystwyth (Gogerddan)	*Cardigan*	52 26	4 1	83	76·0	5	35·0	28	0	...
Llandudno	*Carnarvon*	53 20	3 50	72	75·0	9	44·0	30	0	...
Cargen [Dumfries]	*Kirkcudbright*	55 2	3 37	80	71·0	9	39·0	30	0	...
Lilliesleaf (Riddell House)	*Roxburgh*	55 31	2 46	550	...	..	...	...	...	...
Edinburgh (Royal Observy.)	*Midlothian*	55 55	3 11	442	64·2	17	39·7	4	0	0
Girvan (Pinmore)	*Ayr*	4 49	55 10	207	66·0	30	36·0	30	0	...
Glasgow (Queen's Park)	*Renfrew*	55 53	4 18	144	63·0	10	39·0	24	0	3
Tighnabruaich	*Argyll*	55 55	5 14	50	66·0	17, 29	36·0	24	0	...
Mull (Quinish)	,,	56 36	6 13	35	70·0	17	...	...	...	...
Dundee (Eastern Necropolis)	*Forfar*	56 28	2 57	199	71·8	17	35·0	4	0	...
Braemar	*Aberdeen*	57 0	3 24	1114	...	...	...	...	...	...
Aberdeen (Cranford)	,,	57 8	2 7	120	63·0	8‡	36·0	3, 24	0	...
Cawdor (Budgate)	*Nairn*	57 31	3 57	250	...	...	...	...	...	...
Invergarry	*E. Inverness*	57 4	4 47	130?	...	...	...	...	...	...
Loch Torridon (Bendamph)	*W. Ross*	57 32	5 32	20	...	...	...	...	...	...
Dunrobin Castle	*Sutherland*	57 59	3 56	14	63·0	11	37·5	4	0	...
Castletown	*Caithness*	58 35	3 23	100	70·0	9	36·0	19	0	0
Killarney (District Asylum)	*Kerry*	52 4	9 31	178	66·0	8, 20	40·0	17	0	...
Waterford (Brook Lodge)	*Waterford*	52 15	7 7	104	64·5	26	...	...	...	...
Broadford (Hurdlestown)	*Clare*	52 48	8 38	167	66·0	7§	41·0	30	0	...
Abbey Leix (Blandsfort)	*Queen's County*	52 56	7 17	532	66·0	7, 17	...	...	...	...
Dublin (Fitz William Square)	*Dublin*	53 21	6 14	54	65·2	14	43·0	25	0	0
Ballinasloe	*Galway*	53 20	8 15	160	72·0	13	36·0	29, 30	0	...
Clifden (Kylemore House)	,,	53 32	9 52	105	...	...	...	...	...	...
Crossmolina (Enniscoe)	*Mayo*	54 4	9 18	74	...	...	...	...	...	...
Seaforde	*Down*	54 19	5 50	180	72·0	12	39·0	3	0	...
Londonderry (Creggan Res.)	*Londonderry*	54 59	7 19	320	...	...	...	...	...	...
Omagh (Edenfel)	*Tyrone*	54 36	7 18	280	...	...	...	...	...	...

† and 10, 11. ‡ and 19, 27, 28. § and 11 14. ‖ and 29, 31. ¶ and 29, 30.

RAINFALL FOR JUNE, 1907.

RAINFALL OF MONTH.							RAINFALL FROM JAN. 1.					
Aver. 1870-99.	1907.	Diff. from Av.	% of Av.	Max. in 24 hours.		No. of Days	Aver. 1870-99.	1907.	Diff. from Aver.	% of Av.	Mean Annual 1870-1899.	STATION.
in.	in.	in.		in.	Date.		in.	in.	in.		in.	
2·09	2·03	— ·06	97	·46	1	19	10·63	10·04	— ·59	94	25·16	Camden Square
1·96	1·69	— ·27	86	·28	11	14	11·55	10·16	— 1·39	88	28·36	Tenterden
2·02	1·23	— ·79	61	·35	12	17	12·61	10·75	— 1·86	85	29·93	West Dean
1·89	2·25	+ ·36	119	·61	5	18	11·59	11·48	— ·11	99	27·10	HartleyWintney
1·89	2·03	+ ·14	107	·39	30	20	10·26	11·00	+ ·74	107	24·66	Hitchin
1·99	2·29	+ ·30	115	·70	1	22	11·28	11·12	— ·16	99	26·75	Addington
2·04	2·00	— ·04	98	·26	6	18	10·32	12·21	+ 1·89	118	25·39	Westley
1·89	2·91	+1·02	154	·51	1	16	10·12	13·57	+ 3·45	134	25·40	Brundall
2·32	2·96	+ ·64	128	·61	11	20	16·36	14·91	— 1·45	91	39·00	Winterbourne Stpltn
2·13	1·65	— ·48	77	·50	11	18	15·05	13·20	— 1·85	88	35·00	Torquay
2·12	2·43	+ ·31	115	·48	11	25	15·45	15·71	+ ·26	102	38·85	Polapit Tamar
2·31	2·39	+ ·08	103	·41	24	23	13·03	12·12	— ·91	93	30·75	Bath
2·23	2·73	+ ·50	122	·61	10	20	12·83	11·35	— 1·48	88	29·85	Stroud
2·46	4·13	+1·67	168	·45	5	22	14·31	14·86	+ ·55	104	33·04	Woolstaston
2·41	2·41	·00	100	·59	11	21	12·56	12·14	— ·42	97	29·21	Coventry
1·94	1·50	— ·44	77	·25	24	13	9·76	9·59	— ·17	98	23·30	Boston
2·24	2·16	— ·08	96	·53	11	21	10·81	10·37	— ·44	96	24·70	Hodsock Priory
2·70	3·25	+ ·55	120	·42	30	24	11·48	13·11	+ 1·63	114	26·18	Derby
3·21	7·84	+4·63	245	1·11	5	28	16·75	22·74	+ 5·99	136	42·43	Bolton
2·38	3·07	+ ·69	129	·55	11	23	11·63	13·06	+ 1·43	112	26·96	Ribston Hall
3·69	7·72	+4·03	209	·85	5	27	26·47	33·06	+ 6·59	125	60·96	Arncliffe Vic.
2·12	3·02	+ ·90	143	·84	15	20	11·24	12·30	+ 1·06	109	27·02	Hull
2·03	2·19	+ ·16	108	·39	20	20	11·35	11·94	+ ·59	105	27·99	Newcastle
6·97	17·04	+10·07	244	1·99	4	29	57·36	63·18	+ 5·82	110	132·68	Seathwaite
2·53	3·91	+1·38	155	·38	10	24	17·19	16·80	— ·39	98	42·81	Cardiff
2·61	4·87	+2·26	187	1·28	4	25	19·67	18·92	— ·75	96	47·88	Haverfordwest
2·93	6·20	+3·27	212	·70	24	25	17·59	21·05	+ 3·46	120	45·41	Gogerddan
2·00	2·90	+ ·90	145	·33	20	23	12·18	10·56	— 1·62	87	30·98	Llandudno
2·68	6·66	+3·98	249	·91	4	24	18·75	24·29	+ 5·54	130	43·43	Cargen
2·44	...	...	...	...	...	..	13·88	..	...	...	33·04	Riddell House
...	2·41	..	...	·39	9	21	...	10·15	...	...	...	Edinburgh
2·95	6·75	+3·80	229	1·41	4	28	20·52	...	...	...	48·87	Girvan
2·70	4·04	+1·34	150	·58	30	24	14·94	18·98	+ 4·04	127	35·80	Glasgow
3·76	6·02	+2·26	160	·67	26	25	24·65	28·77	+ 4·12	117	57·90	Tighnabruaich
3·55	3·48	— ·07	98	·41	23	28	23·84	24·93	+ 1·09	105	57·53	Quinish
2·15	4·20	+2·05	195	·60	12	26	12·09	14·00	+ 1·91	116	28·95	Dundee
2·44	2·69	+ ·25	110	...	...	...	14·94	15·80	+ ·86	106	36·07	Braemar
2·09	3·72	+1·63	178	·43	12	22	13·69	14·96	+ 1·27	109	33·01	Aberdeen
2·24	4·52	+2·28	202	1·10	1	20	11·92	15·47	+ 3·55	130	29·37	Cawdor
2·85	4·84	+1·99	170	·75	26	18	24·72	31·62	+ 6·90	128	56·00	Invergarry
4·78	9·41	+4·63	197	1·02	19	30	36·04	50·26	+14·22	140	86·50	Bendamph
2·14	4·89	+2·75	228	·68	1,24	19	13·45	18·54	+ 5·09	138	31·60	Dunrobin Castle
...	3·96	...	...	·58	24	25	...	16·86	...	...	...	Castletown
3·29	3·21	— ·08	98	·44	25	26	25·99	18·98	— 7·01	73	58·11	Killarney
2·61	4·36	+1·75	167	·62	4	23	17·19	15·58	— 1·61	91	39·30	Waterford
2·52	3·65	+1·13	145	·43	29	27	14·12	16·10	+ 1·98	114	33·47	Hurdlestown
2·43	3·63	+1·20	149	·35	8	26	15·20	15·67	+ ·47	103	35·19	Abbey Leix
1·95	2·84	+ ·89	146	·50	4	27	11·88	12·33	+ ·45	104	27·75	Dublin
2·69	4·21	+1·52	157	·73	4	26	15·92	17·76	+ 1·84	112	37·04	Ballinasloe
5·33	6·33	+1·00	119	·77	20	26	34·29	31·03	— 3·26	90	80·23	Kylemore House
2·95	5·60	+2·65	190	·75	19	28	21·74	26·13	+ 4·39	120	50·50	Enniscoe
2·72	5·63	+2·91	207	1·09	22	26	16·92	20·62	+ 3·70	122	38·61	Seaforde
2·92	5·31	+2·39	182	·56	8	28	17·07	25·90	+ 8·83	152	41·20	Londonderry
2·88	...	...	...	...	...	...	15·86	...	...	...	37·85	Omagh

SUPPLEMENTARY RAINFALL, JUNE, 1907.

Div.	STATION.	Rain inches	Div.	STATION.	Rain. inches
II.	Abinger Hall	2·14	XI.	Rhayader, Tyrmynydd	5·00
,,	Ramsgate	1·22	,,	Lake Vyrnwy	7·82
,,	Hailsham	2·30	,,	Llangyhanfal, Plâs Draw	2·46
,,	Crowborough, Uckfield Lodge	3·04	,,	Criccieth, Talarvor	4·71
,,	Totland Bay, Aston House	1·35	,,	Llanberis, Pen-y-pass	20·90
,,	Emsworth, Redlands	2·61	,,	Lligwy	4·72
,,	Alton, Ashdell	2·93	,,	Douglas, Woodville	4·71
,,	Newbury, Welford Park	3·80	XII.	Stoneykirk, Ardwell House	5·74
III.	Harrow Weald, Hill House.	2·10	,,	Dalry, The Old Garroch	5·91
,,	Oxford, Magdalen College	2·94	,,	Langholm, Drove Road	7·68
,,	Bloxham Grove	2·73	,,	Moniaive, Maxwelton House	5·01
,,	Pitsford, Sedgebrook	2·18	XIII.	N. Esk Reservoir [Penicuick]	3·45
,,	Huntingdon, Brampton	1·44	XIV.	Maybole, Knockdon Farm	3·76
,,	Wisbech, Bank House	1·44	XV.	Campbeltown, Witchburn	4·34
IV.	Southend Water Works	1·80	,,	Inveraray, Newtown	6·46
,,	Colchester, Lexden	1·77	,,	Ballachulish House	7·33
,,	Newport, The Vicarage	1·82	,,	Islay, Eallabus	4·22
,,	Rendlesham	1·96	XVI.	Dollar Academy	6·27
,,	Swaffham	2·27	,,	Loch Leven Sluice	5·14
,,	Blakeney	1·86	,,	Balquhidder, Stronvar	6·64
V.	Bishops Cannings	2·59	,,	Perth, Pitcullen House	4·66
,,	Ashburton, Druid House	3·71	,,	Coupar Angus Station	3·75
,,	Okehampton, Oaklands	3·88	,,	Blair Atholl	3·25
,,	Hartland Abbey	3·01	,,	Montrose, Sunnyside Asylum	4·56
,,	Lynmouth, Rock House	3·47	XVII.	Alford, Lynturk Manse	3·96
,,	Probus, Lamellyn	2·97	,,	Keith Station	6·56
,,	Wellington, The Avenue	2·24	XVIII.	N. Uist, Lochmaddy	3·99
,,	North Cadbury Rectory	2·36	,,	Alvey Manse	3·27
VI.	Clifton, Pembroke Road	3·23	,,	Loch Ness, Drumnadrochit.	4·08
,,	Ross, The Graig	2·13	,,	Glencarron Lodge	7·03
,,	Shifnal, Hatton Grange	2·71	,,	Fearn, Lower Pitkerrie	3·10
,,	Cheadle, The Heath House.	4·17	XIX.	Invershin	3·11
,,	Blockley, Upton Wold	2·97	,,	Altnaharra	3·53
,,	Worcester, Boughton Park.	2·38	,,	Bettyhill	3·56
VII.	Market Overton	2·35	XX.	Dunmanway, The Rectory	5·90
,,	Market Rasen	3·01	,,	Cork	3·53
,,	Bawtry, Hesley Hall	...	,,	Darrynane Abbey	4·64
VIII.	Neston, Hinderton Lodge	3·04	,,	Glenam [Clonmel]	3 88
,,	Southport, Hesketh Park	5·92	,,	Ballingarry, Gurteen	3·19
,,	Chatburn, Middlewood	8·10	,,	Miltown Malbay	4·02
,,	Cartmel, Flookburgh	8·32	XXI.	Gorey, Courtown House	4·04
IX.	Langsett Moor, Up. Midhope	6·27	,,	Moynalty, Westland	4·72
,,	Scarborough, Scalby	3·00	,,	Athlone, Twyford	3·83
,,	Ingleby Greenhow	2·97	,,	Mullingar, Belvedere	3·74
,,	Mickleton	3·58	XXII.	Woodlawn	5·00
X.	Bardon Mill, Beltingham	2·92	,,	Westport, Murrisk Abbey	...
,,	Ewesley, Fallowlees	...	,,	Collooney, Markree Obsy.	5·50
,,	Ilderton, Lilburn Cottage	2·94	,,	Mohill	5·00
,,	Keswick, York Bank	6·73	XXIII.	Enniskillen, Portora	5·91
XI.	Llanfrechfa Grange	4·43	,,	Warrenpoint, Summer Hill.	4·51
,,	Treherbert, Tyn-y-waun	11·20	,,	Banbridge, Milltown	4·31
,,	Carmarthen, The Friary	4·41	,,	Belfast, Springfield	5·73
,,	Castle Malgwyn [Llechryd].	4·06	,,	Bushmills, Dundarave	4·97
,,	Plynlimon	1·53	,,	Stewartstown, The Square	4·71
,,	Crickhowell, Ffordlas	5·00	,,	Killybegs	...
,,	New Radnor, Ednol	4·64	,,	Horn Head	4·61

METEOROLOGICAL NOTES ON JUNE, 1907.†

Abbreviations.—Bar. for Barometer; Ther. for Thermometer; Temp. for Temperature; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; TS for Thunderstorm; R for Rain; H for Hail; S for Snow.

London, Camden Square.—An extremely ungenial and harsh month with an abnormal amount of cloud and great want of warmth and sunshine. The R, although falling on an excessive number of days, was normal in amount. Mean temp. 58°·0, or 2°·4 below the average. Duration of sunshine 146·5* hours, and of R 31·0 hours.

Crowborough.—Gloomy, cold and unseasonable, with great absence of sunshine, and persistent cold W. and S.W. winds throughout. The mean temp., 53°·7, was 3°·5 below the average and 1°·1 below that of June, 1903, which was in many respects similar. R ·56 in. above the average; there were not three consecutive days without R. TSS on 1st and 9th.

Totland Bay.—The windiest and coldest June in 21 years. Total wind movement 8,805 miles, and mean temp. 55°·0 Duration of sunshine 175·3* hours, or 36·0 hours below the average.

Torquay.—Duration of sunshine 167·1* hours, or 62·2 hours below the average. Mean temp. 55°·7, or 2°·9 below the average. Mean amount of ozone 5·4.

North Cadbury.—A terrible month, cold, showery, cloudy and excessively windy, with not one calm day. The max. temp. was by far the lowest yet recorded in June, but the min. was only slightly below the average. R only ·04 in. above, but rain days more than double, the average of 10 years.

Bolton.—Enormous R, 3·02 in. in excess of the previous highest fall in June. The pressure, duration of sunshine and temp. were the lowest in 21 years. Mean temp. 51°·2, or 4°·3 below the average. Duration of sunshine 88·3* hours, or 66·6 hours below the average. Wind practically always S. or W.

Southport.—R 3·76 in., and rain days 11, above the average of 25 years and the greatest in that period. Mean temp. 54°·7, or 2°·6 below the average. Duration of sunshine 150* hours, being 70 hours below the average. Duration of R 90·8 hours.

Haverfordwest.—Cold, wet and stormy throughout, being the wettest June since 1882. Duration of sunshine 159·1* hours.

Douglas.—The coldest June of which there is any record, the mean temp. being 4°·1 below the average. That of the last fortnight was much below that of the first. The R had been slightly exceeded twice in 33 years, but the duration of sunshine only in 1897, which, however, was far warmer.

Girvan.—By far the wettest and coldest June in 33 years.

Stronvar.—Very wet and cold. All growth was at least a fortnight later than can ever be remembered in this district.

Coupar Angus.—The mean temp., 51°·9, was the lowest in 27 years, and the R the heaviest in that period except in 1897.

Lochmaddy.—R about double the average, and only twice approached during 23 years. The number of rain days was the highest ever recorded.

Drumnadrochit.—R 2·08 in., and rain days 11, above the average of 25 years. The R was once exceeded, but the rain days never. It was altogether cold, cheerless and boisterous, without sunshine.

Dunmanway.—Very wet, cold and unlike June. In some places potato blight began about the middle of the month. TS on 23rd with H stones as large as small marbles.

Cork.—Mean temp. the lowest in June for 25 years, that of 1902 being the same. R ·77 in. above the average.

Miltown Malbay.—Colder and with less sunshine than last November. Fierce N.W. gales, eternal R and H prevailed till the end.

Dublin.—A more inclement June than that of the memorable year of 1879, establishing records for low temp., high wind and frequency of R. Mean temp. 55°·9, or 2°·1 below the average. TSS on 10th and 24th.

† See also p. 107. * Campbell-Stokes.

Climatological Table for the British Empire, January, 1907.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Date.	Absolute. Minimum. Temp.	Date.	Average. Max.	Min.	Dew Point.	Humidity. 0-100	Absolute. Max. in Sun.	Max. on Grass.	Total Rain. Depth.	Days.	Aver. Cloud.
	°		°		°	°	°		°	°	inches		
London, Camden Square	51·4	1	22·1	24	43·1	34·1	35·5	87	73·7	19·7	·91	8	...
Malta	...	...	...	...	...	...	...	...	...	...	...	...	...
Lagos	90·0	29	70·0	17	87·5	76·7	72·9	78	150·0	67·0	1·10	4	7·9
Cape Town	98·2	31	52·5	15	78·1	60·6	56·5	64	...	...	·57	4	2·6
Durban, Natal ...	90·7	6	63·2	12	82·8	68·4	...	...	153·6	...	3·02	22	5·7
Johannesburg	78·4	3	52·0	22	72·9	56·0	57·4	81	161·9	51·1	7·22	22	5·9
Mauritius	88·5	21	66·0	20	85·0	70·0	67·2	73	153·0	60·4	1·70	20	6·2
Calcutta...	86·6	28	52·1	2, 3	80·0	57·7	57·4	68	138·6	45·3	·00	0	1·1
Bombay	88·9	1	66·3	11	84·9	70·4	65·9	70	136·3	56·9	·00	0	0·6
Madras	...	...	...	...	...	...	...	...	...	...	...	...	...
Kodaikanal	70·4	28	40·8	15	62·8	46·3	42·3	66	128·9	19·9	·97	4	3·6
Colombo, Ceylon ...	90·4	1	69·6	26	87·5	72·6	70·8	78	150·8	66·8	·83	7	3·5
Hongkong	75·0	1	45·0	31	66·3	57·0	51·4	69	129·9	...	3·45	7	4·4
Melbourne	95·6	18	49·9	10	76·0	57·0	53·7	71	151·2	39·5	1·10	4	5·4
Adelaide	106·3	18	50·0	29	82·5	59·0	52·4	53	159·8	45·8	·10	2	2·9
Coolgardie	104·2	26	47·9	19	87·6	59·1	48·8	42	172·2	45·0	·23	5	2·2
Sydney	88·0	6	59·8	11	78·5	65·0	60·4	66	129·4	52·8	2·69	20	7·1
Wellington	80·2	9	46·0	19	69·7	58·1	54·0	70	139·0	37·0	3·34	8	5·0
Auckland	84·0	28	50·0	19	73·2	61·8	58·0	72	147·0	43·0	7·45	12	5·6
Jamaica, Negril Point.	90·9	14	61·0	31	84·8	67·0	66·0	74	...	...	·89	5	...
Trinidad	...	...	...	...	...	...	...	...	...	...	...	...	...
Grenada	85·2	30	67·8	29, 30	81·6	71·2	71·5	81	146·0	...	2·54	18	3·7
Toronto	51·4	20	-10·0	24	28·3	15·7	21·4	86	57·0	-13·9	2·32	6	7·9
Fredericton	47·5	20	-21·2	17	20·1	-1·5	...	74	...	...	·94	4	5·3
St. John's, N.B. ...	48·5	1	-17·0	17	25·9	7·2	...	...	...	...	1·32	5	5·4
Victoria, B.C.	48·2	21	14·8	15	37·6	28·9	...	...	...	...	2·64	10	6·5
Dawson	20·0	13	-59·0	20	-15·2	-30·9	...	..	...	...	·00	0	6·4

Johannesburg.—Bright sunshine 53 per cent. of possible amount.

Mauritius.—Mean temp. of air 2°·2, dew point 3°·0, relative humidity 2·5 per cent., and R 5·55 in. below, averages. Mean hourly velocity of wind 7·8 miles, or 2·1 below average.

KODAIKANAL.—Bright sunshine 249 hours.

COLOMBO.—Mean temp. of air 79°·3 or 0°·2 above, of dew point 0°·8 above, and R 2·73in. below, averages. Mean hourly velocity of wind 8·5 miles.

HONGKONG.—Mean temp. of air 61°·4. Bright sunshine 195·8 hours, or 55 hours above average. Mean hourly velocity of wind 12·4 miles.

Adelaide.—Mean temp. of air 3°·3 below, and R ·76 in. below, averages.

Sydney.—Mean temp. of air 0°·2 above, and R ·79 in. below, averages.

Wellington.—Mean temp. of air 63°·9 or 1°·1 above, and R ·12 in. below averages.

Auckland.—Excessively wet and stormy from 9th to 16th; 2·15 in. of R fell on 14th and 1·82 in. on the 15th, and 7·08 in. between the above dates. The total for the month, 7·45 in., was the largest for January ever recorded here.

Symons's Meteorological Magazine.

No. 499. AUGUST, 1907. Vol. XLII.

THE BRITISH ASSOCIATION AT LEICESTER.

The annual meeting of the British Association for the Advancement of Science took place at Leicester, from the 31st of July to the 7th of August. The local arrangements were admirably carried out, the receptions and garden parties were so brilliant that the oldest frequenter could not say that he had ever seen finer. The excursions were well planned and much appreciated. The hospitality of the people of Leicester fulfilled the best traditions in the history of the Association—even the weather lent itself for once to the success of the meeting. The number of members was smaller than usual, and as a result the sum available for distribution in aid of science was less than of recent years; but the Kite Committee and the Committee for the publication of the Ben Nevis observations, each received a grant of £25.

The Meteorological Breakfast—the seventh of the second series—was held at the Grand Hotel, on the morning of Tuesday, the 6th, and there were 26 meteorologists and rainfall observers present, ladies as well as gentlemen taking part. The following is the complete list:—

J. Abercromby Alexander	Bedford	E. Kitto	... Falmouth
Dr. J. R. Ashworth	... Rochdale	Dr. H. R. Mill ...	... London
G. H. Barber ...	... London	Mrs. H. R. Mill ...	... ,,
C. O. Bartrum ...	... ,,	J. E. Petavel, F.R.S.	...Manchester
Col. Bigg-Wither	... Godalming	A. Pilling	... Capetown
Dr. Otto Boeddicker	.. Birr	E. A. Reeves ..	... London
G. G. Chisholm ...	... London	Dr. W. N. Shaw, F.R.S...	,,
Laurence Gomme	... London	Mrs. W. N. Shaw ..	,,
Mrs. Gomme	,,	M. B. Slater ...	... Malton
Allen Gomme	,,	C. Michie Smith ...	...Kodaikanal
Charles Hawksley, C.E....	,,	John Smyth, C.E.	... Banbridge
A. R. Hinks ...	... Cambridge	Miss C. O. Stevens	... Reading
T. V. Hodgson ...	... Plymouth	Prof. H. H. Turner, F.R.S.	Oxford

Reference was made at the breakfast to the fact that this gathering was the only one in connection with the Association at which those interested in observational study could meet together in virtue of their particular interests, and the opinion was expressed by more than one speaker that the time had fully come when meteorology should have separate recognition amongst the sections.

The meteorological papers which had been accepted by Section A were put down in the programme for Tuesday, but they were, as in former years, sandwiched alternately with papers on astronomy and optics, in such a way that everyone was heartily tired of waiting after hearing one paper in which he was specially interested before the next on a cognate subject was reached. The grievance is no new one; but whatever respect one feels for the dignity and distinction of the austerest section of the Association, it is no longer possible to refrain from definite criticism. In our opinion, and in this opinion we are not alone, Section A is overloaded with material too diverse to be held together under a common label. Even if the Section is sometimes sub-divided the science of meteorology, for which alone we speak, is unfairly treated. This year there was no physicist known to be sympathetic with meteorology amongst the officers of the section, and scarcely one amongst the meteorologists present at the meeting was upon the Committee. We say scarcely one, for one whose name most properly appeared was not present on the earlier days, and so was unable to do anything to improve matters. We hold the officials of the Section entirely responsible for the faulty arrangement and bad time-keeping, which made it impossible for important meteorological papers to be treated adequately, and caused even the reporters of that Gallio in matters scientific, the *Daily Mail*, to comment on the situation. There was a little grievance also, which the mathematicians and physicists of Section A shared with their more neglected colleagues,—this was the bewildering acoustic properties of the hall where the meetings were held. When the speaker faced a particular member of the audience and spoke distinctly that particular member heard perfectly; but when the speaker turned his head, ever so slightly, a confused reverberation made the words indistinguishable, and when he turned at right angles to the hearer, an exquisitely sharp echo sprang into being, so that if he spoke slowly every word was heard twice, if he spoke rapidly nothing was distinguishable but the last word of the sentence, duplicated with ringing emphasis. We amused ourselves after we had to give up the attempt to understand the papers by following with eyes shut the changes in azimuth of the speaker's head by the changes in the echo accompaniment.

Taken all round, the meteorologists had a bad time in the sections, and it is sincerely to be hoped that a new section—or at least a sub-section with a chairman, who is interested in observational studies—will be formed at an early date, otherwise it will not be worth while for any meteorologist to offer a paper to the British Association. One is strongly tempted to believe that the type of scientific mind which prevails in the quarters whence such institutions as the British Association are directed, holds that methods are all-important, and results useful only as proving the applicability of methods, while the data are merely looked upon as algebraic symbols, a or b serving as stepping stones to x and z, and not as

actual phenomena, the comprehension of which is the sole justification for applying any method at all. At the Meteorological or any other breakast, we do not consider that the end of the meal is served when we have proved that knife and fork and spoon can be applied to reduce certain solids and liquids to an assimilible form. The nature of the food is universally regarded as the most important thing, whether it be served with steel or silver. To us, as students of nature, the subject of study must always be more important than the methods which help us in the task.

The difficulties in the way of hearing and discussing the meteorological papers this year were the more disappointing because several of those which were presented were of exceptional interest, and we much regret the inadequate reports which we must offer to our readers. Although we look upon the data and the result of their discussion as much more important than the methods employed, we are fully aware that there is great scope for the treatment of meteorological statistics by new methods, and thus we hailed the discussion to be introduced by a paper on "Modern Methods in Meteorology," by Mr. Palin Elderton, with pleasurable anticipations. Unhappily, the Abstract supplied gives a minimum of information, but it is all we have to offer. Dr. Shaw's paper on new methods in forecasting from synoptic charts was cut cruelly short, on account of the failure of presidential compression in the case of a previous astronomical paper, and the reports on the extremely important kite and balloon observations were no better treated.

In other Sections there was little of meteorological importance, though some speculations of an interesting kind were made in a paper on "The Interior of the Earth," by Professor Milne, in Section C; and some rainfall data were brought forward by Mr. Smyth, of Banbridge, in Section G.

The following are the titles of the papers announced for reading in Section A, as set out in the Association's Journal :—

W. Palin Elderton.—Examples of modern Methods of treating Observations. The following members will take part in the discussion: Dr. W. N. Shaw, G. U. Yule and A. R. Hinks.

Dr. W. N. Shaw, F.R.S.—Recent Developments of the Methods of Forecasting by means of Synoptic Charts.

C. Michie Smith. — A Mountain Observatory in South India. (Lantern.)

Miss M. White, T. V. Pring and J. E. Petavel, F.R.S.—An analytical Study of the Meteorological Observations made at the Glossop Moor Kite Station during 1906-7.

Report of the Committee on Kites.

W. A. Harwood and J. E. Petavel, F.R.S.—Preliminary note on the recent International Balloon Ascents (Manchester station).

Report of the Ben Nevis Committee.

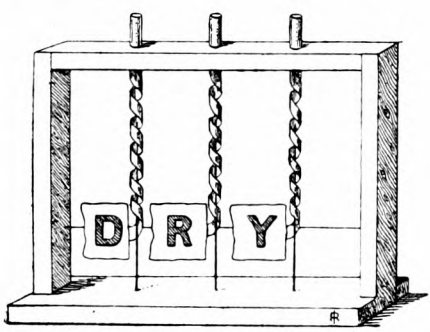
(*To be continued.*)

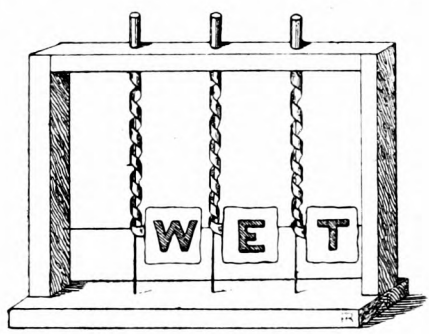
WEATHER WHIMS.—III.

THE FOIL HYGROSCOPE.

By Richard Inwards.

Many are the contrivances for showing changes of moisture in the air, but none is more sensitive than the silver-foil weather-flag, as depicted in the accompanying sketches. It consists of three slips of the foil used by jewellers to enhance the effect of precious stones, and sometimes to glorify pieces of plain glass so as to make them appear like gems. This foil consists of very thin silver or copper, coloured on one side with a kind of varnish, suitable for the purpose. I find that designed to imitate the sapphire does very well. It is of a fine blue colour. Three small slips are cut off by scissors (not a knife or the varnished part will peel off), these strips are then twisted round a wire until they resemble ringlets or shavings, as shown in the sketch, of course the wire is slipped out. These ringlets are supported as shown, and a needle set in the baseboard and running





up the hollow centre of each serves to keep it roughly in place, and to prevent breaking by accident. Three little paper flags are attached as shown, having on one side the letters D R Y, and on the other W E T. It will then be found that these flags turn round instantly when the air becomes damper or drier—indeed they will turn on the approach of a moist hand, or when they are ever so lightly breathed upon, and the strange thing is that they go back just as quickly when the damp stimulus is withdrawn. A wire stretched across the frame prevents the flags from going beyond the position where the letters are most visible. The spiral slips are fixed by seccotine at the top to small pegs which can be turned round for adjustment if required.

It is of course the varnish or colouring matter which is the hygroscopic material. I have not been able to find out what this substance is, although I have experimented with gums shellac, dextrine and other things with negative results.

My friend, Mr. Augustus Stroh, pointed out this property of the foil to me and enabled me to construct this weather-toy, which I have had some time under observation with satisfactory results.

THE KITE DISPLAY OF THE AËRONAUTICAL SOCIETY.

THE kite display organised by the Aëronautical Society of Great Britain, took place on Chobham Common, on July 1st, in the presence of a large assembly of the members and their friends, there being upwards of three thousand persons present.

At the time of the commencement of the display there were eleven large scientific kites in the air at the same moment.

Mr. W. H. Dines, F.R.S., exhibited two box kites with meteorograph of the kind in common use at the station of the Meteorological Office at Pyrton Hill. One of these was 9 ft. high, having 77 square feet of lifting surface, and weighing 11 lbs. This is the type suitable for light and moderate winds of less than 40 miles an hour, and with 10,000 feet of wire will lift a meteorograph to a vertical height of 6,000 feet. The other was 7 ft. 6 in. high, having 52 square feet of surface, and weighing 9 lbs. This type will fly in winds ranging from 25 to 50 miles an hour, and with 5,000 feet of wire will carry the recording instruments to a height ranging from 3,000 to 3,500 feet. Mr. Charles Cave also displayed a kite of the type used by Mr. Dines. Mr. Salmon's exhibit was remarkable for originality and the number of kites exhibited. One of these kites was made specially for this display, and had nine wings at each side of a backbone 18 feet high. The wings have a span from tip to tip of 10 feet. Mr. Salmon claims that this type of kite is well adapted for light winds and is easy to manipulate. Such a kite has often enabled him to raise his meteorograph 1,600 feet, when a box kite would not have left the ground. Mr. Salmon's claims were supported by actual test in this display, when with the light wind blowing the kite attained a height of some 3,000 feet. Mr. Salmon also contributed several types of box kites, and a Hargrave kite made by Mr. Hargrave. Some of the box kites had the acute angle to the front and some the obtuse. Other kites shown by the same exhibitor were a quinquengular box kite and the Barclay honeycomb kite.

Mr. Charles Brogden, who in the Aeronautical Society's Kite Competition at Finden, in 1903, attained the highest flight with his six winged bird kite, again gave a demonstration of the admirable flying qualities of this kite. On the latter occasion the height attained was estimated at about 3,000 feet (perpendicular), 3,800 feet of wire being out. The angle of the kite was fairly constant at 56 to 50 degrees from the horizontal.

Mr. Balston exhibited Zenith kites and Butterfly kites. The former are adapted for flights in strong winds, and the latter for light winds.

A Ballon-Sonde with the light meteorograph designed by Mr. Dines, recording pressure and temperature, was sent up by Mr. Charles Cave. A small rubber balloon was used having a capacity of between six and seven cubic feet when unstretched, but capable of expanding to a much larger size. The balloon was filled with

hydrogen, and had a linen parachute placed over it to which the meteorograph was attached. The ascent of the balloon was observed with theodolites placed at each end of a base of about 1,560 feet, set out at right angles to the direction of the wind. One theodolite was an ordinary transit instrument, the other has been specially designed by M. de Quervain for observing balloons. It has a reflecting prism in the axis of the telescope, so that the observer is always looking in a horizontal position even if the balloon is passing through the zenith. The balloon fell at Upminster, Essex, 41 miles east by north half north.

Mr. José Weiss performed some highly successful experiments with model gliders. There were three of these gliders exhibited, having wing areas of 3·6, 8·4 and 12·8 sq. ft., with total weights of 2½ lbs., 6 lbs., and 15 lbs. respectively; the lead ballast in each case representing about two-thirds of the total weight.

When launched from the highest hillock available the best glides obtained were some 200 yards in length, with a drop of from 30 to 50 feet. The small model, raised some 200 feet by Mr. Brogden's large kite, and released from that height, righted itself instantly in each case and gave some very fine glides, the longest being about 200 yards. E. S. B.

ROYAL METEOROLOGICAL SOCIETY.

THE last meeting for the present session was held at the Society's Rooms, 70, Victoria-street, Westminster, on Wednesday afternoon, June 19th, Dr. H. R. Mill, President, in the chair. Exigencies of space make it necessary to condense our report greatly.

Mr. F. Campbell Bayard read a paper on "Weather and Crops, 1891—1906." Mr. R. H. Hooker, Mr. R. Cooke, Mr. R. G. K. Lempfert and the President took part in the discussion.

A paper by Dr. C. P. Hooker on "The Relation of the Rainfall to the Depth of Water in a Well" was also read. The author gave the weekly measurements of the depth of water in a well 101 feet deep at Further Barton, Cirencester, compared with the weekly rainfall for the years 1903 to 1906, in continuation of an earlier paper to the Society dealing with the measurements of the same well for the years 1887—1902. The well measurements have now terminated on account of the death of the former owner.

Mr. Baldwin Latham believed that a thorough investigation of the level of water in wells would throw much light on the subject of crops. He thought that water percolated in excess in some years, robbing the earth of its nutriment, and consequently impoverishing the next crops.

Mr. Walter Child exhibited and described his "Step" Anemometer, which he has designed to obviate the "sheltering error." This instrument is a Robinson Anemometer, with the cups so

placed on the spindle that the arms are in different horizontal planes, thus one cup does not shelter another and the system comes to rest more rapidly when the wind drops.

The following gentlemen were elected Fellows of the Society:—Lieut. J. Adams, R.N.R., Sir Philip Brockelhurst, Bart., Capt. G. S. Cary, Mr. H. Chapman, Mr. J. I. Craig, M.A., Lord Ronald Sutherland Gower, Mr. G. S. Marshall, Mr. E. H. Shackleton (leader of the British Antarctic Expedition, 1907), Mr. F. R. Shackleton, Mr. D. S. Steuart, and Sir Arthur Vicars, K.C.V.O., Ulster King of Arms.

SCOTTISH METEOROLOGICAL SOCIETY.

The usual half yearly meeting of this Society was held in Edinburgh on July 9th. The Report from the Council of the Society to the General Meeting was presented, and contained the following among other paragraphs:—

Since the last meeting of the Society, the Station at Clathick, Perthshire, has been discontinued. The Council, however, are glad to say that instruments formerly at Clathick have been removed to the Strathearn Hydropathic, Crieff, where a Station has been opened under the charge of Dr. Meikle. . . . . .

It is with profound sorrow that the Council have to report the death of Dr. Alexander Buchan on 13th May last. Appointed Meteorological Secretary in 1860, when the Society was in its infancy, Dr. Buchan occupied that position for the long period of forty-seven years. This is not the place to refer to the many and great services rendered by Dr. Buchan to Meteorological Science, but the Council desire to record their sense of how much the Society owes to him. The results of many of Dr. Buchan's most important researches appeared first in the Society's *Journal*, and the welfare and honour of the Society were ever his foremost consideration. For nearly half a century the Society has been guided by a man whose faithful use of great natural gifts brought him a world-wide reputation, and whose ungrudging service has given the Society prominence in the scientific world. The Council propose to include in the next issue of the *Journal* papers dealing with various aspects of Dr. Buchan's scientific career.

The Council have appointed Mr. Andrew Watt, M.A., F.R.S.E., Meteorological Secretary to the Society. Mr. Watt had been for some time Assistant-Secretary, and largely responsible for the general work of the Society.

After the Report had been received tributes to the memory of Dr. Buchan were paid by Lord McLaren, Sir John Murray, Mr. J. G. Bartholomew, Mr. R. T. Omond and Mr. A. Watt. No meteorological papers were read, the meeting having very appropriately assumed the form of a memorial to the late Meteorological Secretary.

BEN NEVIS OBSERVATORIES.

WE quote the following from the Parliamentary Report in *The Times* of Friday, August 2nd :—

Mr. McCRAE (Edinburgh, E.), on behalf of Sir J. Dewar (Inverness), asked the Chancellor of the Exchequer if he was in a position to say whether he was able to accede to the request of the Scottish members of Parliament for a grant to the Scottish Meteorological Society for the purpose of re-opening and maintaining the Ben Nevis Observatories.

THE CHANCELLOR OF THE EXCHEQUER (Mr. Asquith).—The only scheme which has up to the present been placed before me is one under which the whole cost is of the re-equipment and maintenance of the Observatories would be thrown upon public funds, and to this I should not feel justified in assenting. I am, however, quite prepared to consider the question of renewing the Government grant, which was for many years given to these institutions through the Meteorological Council, provided that an adequate contribution towards their re-establishment and maintenance is forthcoming from other sources.

THUNDERSTORM RAINS OF JULY, 1907.

THE monthly rainfall maps in summer always present irregularities of distribution, due to heavy falls of rain during thunderstorms of short duration which affect small areas, and we are overwhelmed with correspondence on the subject, all of which we are glad to get, though we cannot find space to give all the communications in the words of the authors. The following particulars given in order of date, deserve to be put on record, and we thank our correspondents for their kindness in sending them.

July 10th.—MR. S. F. HURNARD, of Hill House, Lexden, near Colchester, reports that a severe thunderstorm passed over his station. Rain fell from 9.55 a.m. to 11.30 a.m., and yielded 1·30 in. in 1 hr. 35 min. Included in this measurement was a heavy fall of hail, which occurred between 10.40 and 11.10 a.m. Another lesser storm occurred about noon, and the total reading for the 24 hours was 1·70 in. Another rain gauge, 1½ miles to the east, yielded ·90 in., and a third still farther east only ·76 in.

July 19th.—MR. JOHN SMYTH, Milltown House, Banbridge, sends particulars of a thunderstorm with remarkably heavy hail. The storm occurred in the afternoon and evening, and at Lenaderg and other places the hail broke large quantities of glass. In one case 600 and in another 382 panes were broken.

July 21st.—MISS A. PLEYDELL BOUVERIE, The Old House, Market Lavington, Wilts, said that thunder was heard about 3.30 p.m., and rain began to fall about 3.45, lasting until 7.30 p.m., and yielding 2·55 in. in 3¾ hours. Hail accompanied the rain.

DR. SYMONS, writing from the Health Office, Guildhall, Bath, reports a rainfall of 2·90 in. at Combe Park, 2·69 in. at Henrietta

Park, and only 1·25 in. at the Statutory Hospital, 2½ miles to the south-east. The rain fell between 4 and 7 p.m.

MR. R. LEWIS LLOYD, Somerset Place, Lansdown, Bath, reports that rain began at 4.5 p.m. At 5.15 p.m. the rain moderated, and he found that 2·49 in. had fallen in 1 hour 10 min. The total fall, measured at 9 a.m. next day, was 3·27 in. He considers that Lansdown had the most severe fall in Bath on this occasion.

REV. J. TOMSON, The Rectory, Rochford, Tenbury, heard thunder about noon far away to the north-west, and at 2.45 p.m. it broke overhead, the wind suddenly rising, and by 3.15 p.m. 1·61 in. of rain was measured as the result of half-an-hour's fall. It was accompanied by hail of great size, including irregular pieces of hard clear ice. The area seriously affected was narrow, not exceeding a mile from east to west. In one hop garden the damage done by the storm was estimated at £600.

MR. LEWIS H. WILLIAMS, Edenderry, King's County, reports a fall of 1·14 in. in 20 minutes, from 5.50 to 6.10 p.m.

The storm was exceedingly severe in the north of Ireland, a fall of 1·98 in. in about an hour-and-a half being reported by MR. JOSEPH H. WELCH, of Londonderry, as occurring in the Shantallow district.

Other heavy falls on the 21st were Bourton-on-the-Water 2·06 in., Hampson in-Eliel 2·13 in., and Prestbury 1·97 in.

July 22nd.—The storms on this date were so remarkable that we devote special attention to them. One very heavy outburst occurred just to the north of London, producing in a few hours three times as much rain as fell in the south of London during the whole month.

MISS ABETHELL, Colney Hatch Lane, Muswell Hill, N., reports that the storm was very heavy from 2.50 to 6.30 p.m., by which time 1·95 in. had fallen in 3 hours 40 mins., and ·35 in. fell subsequently, making the total for the 24 hours 2·30 in.

MRS. H. R. MILL, The Hollies, Mill Hill, N.W., measured 2·15 in. at 6·40 p.m., the result of 3½ hours rain, and at 9 a.m. next morning the total reached 2·35 in. The lightning was of blinding intensity and the thunder terrific. The torrential rain washed out channels from 6 to 8 inches deep in firm gravel walks.

MISS STANTON, of Upfield, Stroud, writes, that after a thunderstorm on the 21st, yielding ·40 in. of rain, another came up from the north-west on the afternoon of the 22nd, with very heavy rain, 1·83 in. falling in 1 hour 30 min. from 3 p.m. to 4.30 p.m.; the rain continued with less intensity until 7.15 p.m., by which time 2·16 in. had fallen.

REV. R. P. DANSEY sends newspaper cuttings descriptive of the storm on the border of South Wales, and supplements them by a full and most interesting account of the work of the storm in the Black Mountains, which we hope to publish later with illustrations. Meanwhile we quote the following from the *Hereford Times*:—

The storm which approached from Talgarth way, over the Black Mountains, broke about 2 o'clock, and in a very short time the river Monnow

rose enormously, and the adjoining fields were flooded two or three feet deep. A remarkable phenomenon was the fierce shower of hailstones, which varied from the size of a walnut to a hen's egg . . . . In one portion of the Llanthony Road, for about twenty yards, the hailstones had fallen over 5 feet in depth, and the road was impassable for either vehicles or pedestrians. The Cwmyoy postman, who was returning to Abergavenny, had to leave his horse and cart behind and make his way through the ice and water as best he could . . . . On a piece of road from Henllan to Holly Pitch the road metal was carried right away, and at the bottom of the pitch there is a deposit of about 50 tons.

The district which suffered the worst of all was in the neighbourhood of Tredrenow, where the hailstones fell in such volume and force that they completely blocked the river, turning it out of its course across the road and the land adjoining. Numbers of trout and other fish were left on the road and in the fields.

Another observer writes in the same paper that he had great difficulty in getting through the great mass of hailstones on Tuesday forenoon, the day after the storm. At one place, along 40 yards of the road, the hail, which had been crushed down by the traffic, was still one foot deep, and at the sides of the road quite 5 feet. About half or three-quarters of a mile above Tredrenow, he saw an enormous chasm on the north side of the valley, down which a torrent was roaring, and he continues as follows :—

When I stopped fishing, I had a good look at the area of the storm coming back, and judged it to be nearly three-quarters of a mile wide. There was a fairly clearly defined line on each side where no hail had fallen at all, but within its area practically all vegetation had been shattered (short of trees). Bark was stripped from hedges, dock leaves reduced to skeletons, and corn simply made into pulp. I carefully examined the hailstones, and found them the size of large marbles. Eighteen hours before they must have been as large as pigeon's eggs. I was told that in the valley of the Grwyny (the next valley south) the storm was even worse.

Rev. Philip Stapleton, S.J., of St. Beuno's College, St. Asaph, says that a severe storm passed up the vale of Clwyd in the night. It began about 1.30 a.m., and the lightning was frequent and vivid, heavy rain commenced about 1.45 a.m., and lasted, with breaks, until about 4.30, in that period of 2 hrs. 45 mins., 1·22 in. fell.

Other heavy falls reported on the 22nd were 2·35 in. at Hornsey, London, N.; 2·12 in. at Etchingham Park, Finchley; 2·65 in. at Watford; 2·29 in. at New Inn, near Brecon; and 1·93 in. at Witney. The following stations reported falls exceeding an inch on the two consecutive days, 21st and 22nd.

Station.	New Inn.	Prestbury.	Torpantau.	Gt.Barrington.	Northleach.	Witney.
21st ...	1·01	1·97	1·20	1·60	1·54	1·25
22nd...	2·29	1·61	1·30	1·16	1·08	1·93
Total..	3·30	3·58	2·50	2·76	2·62	3·18

July 30th.—Rev. A. L. Brine, of Willesborough Rectory, Ashford, Kent, reports a thunderstorm of 13 minutes duration, com-

mencing at 2.1 p.m. In the first five minutes ·25 in. of rain fell, and the whole fall for the 13 minutes was ·38 in.

MR. J. BEETHAM WILSON, High Street, Dorking, writes that ·15 in. of rain fell in 10 minutes from 3.20 to 3.30 p.m., in a sharp thunderstorm.

In spite of the heavy falls quoted above the month as a whole was a dry one, the deficiency from the average being about 22 per cent. for the British Isles as a whole.

THE THUNDERSTORM OF JULY 22nd IN SOUTH-EAST CLARE.

By LIEUT.-COL. W. C. BENTLEY.

THERE were two distinct thunderstorms on the 22nd. The first came from the south-east, and went to the north-west, passing well to the north of Broadford. It began at 3.30 p.m., and ended at 5.30 p.m. There were only a few drops of rain at Broadford, Hurdlestown, but I could see there was much rain farther to the north-east.

The second storm began at 5 p.m., and lasted till 10 p.m. It came at right angles to the course of the first storm; that is to say, from the south-west passing to the north-east. There appeared to be much rain to the north; but here only ·22 in. was recorded next morning. But the drops of rain were very large. There must have been a teaspoonful of water in each of them, as the splash they made on the dry dusty roads was about an inch and a half in diameter.

There is a small district east of the Kilbane mountains, lying between that place and Killaloe, where a tremendous fall of rain took place. It is only four miles by the mountain road from Kilbane to Killaloe, one mile of which is on the west side of the pass, and three miles on the east side. On the 27th, five days after the storm, I walked this road from Kilbane to Killaloe. Hardly any rain had fallen on the west side of the pass, as the road was hardly washed clean; but on the east side the road was clean gone. Great cuts were made in it, some ten feet deep, and in one place there was a gap fully 30 feet deep. Four times I had to get into the fields in half-a-mile, as the cuts in the road were too wide and deep to get over. Between that and Killaloe there are two small rivers. I had to ford both, as the two bridges had been carried away. But one may judge how small these rivers are, when I carried my bicycle over them without getting my feet wet. One was only a wooden foot bridge, and the flood took it at once; but the other was a large stone arch, 25 feet high and 20 feet wide. Not a sign of this bridge was left; the very foundations on the solid rock were carried away. The oldest man in that neighbourhood never remembers such rain, or such a flood, as there was that evening. I was told that the hail fell not in the form of round stones, but in large rugged lumps of ice.

The whole mountain side for 3 miles was a flood everywhere. Great damage was done; farm-houses were flooded, sheep and pigs carried away, and crops destroyed. Whole fields of potatoes and turnips were washed clean away. On the bank of one of the rivers a dead ass was left in the fork of a tree, 15 feet above the ground, by the flood. In all five large stone bridges and one timber bridge were carried away. This all took place in a district 3 miles long and 1 mile wide. For a mile south of the mountains, the roads were hardly washed, yet no sand or gravel was left in either of the rivers, it was all washed away down to the hard rock. On the banks of one river there was a small wood of very large and old beech trees, nearly all of which were torn up by the roots; and a road was washed clean away for about 100 yards. It will cost the County Council about £3,000 to repair the roads and bridges; and the damage to private property must amount to as much more.

Correspondence.

To the Editor of Symons's Meteorological Magazine.

LOCAL STORMS.

THE last number of your Magazine is almost as interesting to me for what it omits as for what it reports. I refer to the absence of any reference from Camden Square of the brisk thunderstorm which was observed here during the late afternoon of Saturday, 29th June. It seemed to come from S.S.W.; and I see by the splendid report of Mr. G. von U. Searle, on page 112, that he also experienced it in West Kensington.

The storm put into my gauge ·92 in. of rain, making the month's "takings" 3·09 in.; it gave Mr. Searle 1·22 in., so raising his total to 2·92 in.—curiously near to my own; and as the month's fall in Camden Square was without it 2·03 in, if this storm had called and treated you as liberally as it did us, we should have stood pretty nearly on the same level. Does anybody happen to know the extent of the area affected? One feels he would like to understand what is the guiding or limiting factor in the development of such phenomena.

WILLIAM GODDEN.

38, Burrard Road, West Hampstead, N.W., 19th July, 1907.

[The storm of June 29th brought ·42 in. of rain to Camden Square. All thunderstorms bring intense rains to small and often curiously outlined areas, the position of which is carefully studied and mapped for as many storms as time permits in *British Rainfall* for each year. The storm of July 22nd was much more remarkable in this respect than that of June 29th.—ED. *S.M.M.*]

"A BUSHEL OF MARCH DUST IS WORTH A KING'S RANSOM."

I HAVE always understood this saying to refer, not to the probable character of the ensuing summer, but to the value of a dry March from an agricultural point of view—as being favourable for spring sowing and cultivation. The beneficial effects of a dry spell at this season are undoubted; and no farmer was ever heard to complain of a dry March, especially if followed by seasonable "April showers."

Clifton, 25th July, 1907. ROBT. F. STURGE, F.R.Met.Soc.

COMPARISON OF SEASONS.

I WAS interested in Mr. McDowall's conclusions in the July magazine especially with regard to a dry March preceding a warm summer. My records for the Southern Counties are only complete for the 24 years 1883–1906, in which 8 dry Marches—at least half-an-inch below the average—were succeeded by 7 warm summers and 1 cold, *i.e.*, 87½ per cent. This seems remarkable, although the period is obviously too short to establish a rule for these results.

The following also refer to the same period of 24 years :—

Mild or cold winters, followed by summers of the same character—				
	16 times out of 22, or 73 per cent.			
Warm or cold springs	14	,,	,,	20, or 70 ,,
Wet or dry winters	5	,,	,,	18, or 28 ,,
,, ,, springs	11	,,	,,	16, or 69 ,,

Haslemere, Surrey, August 5th. ARTHUR F. PARBURY.

PHOTOGRAPHIC SUNSHINE RECORDERS.

WITH reference to your remarks in the October number of the *Meteorological Magazine* for 1906 (p. 168) regarding the Jordan Sunshine Recorder, I made a series of comparative observations with this instrument and the Campbell-Stokes Recorder during the months of March and April of the present year. The results of these experiments I venture to submit to you herewith, and, thinking you may be interested to compare the *actual* records, I likewise send them for your perusal.

I find that the Jordan recorder registered 15 hours more sunshine than the Campbell-Stokes in the period of 61 days. During those months there was an exceptional amount of bright sunshine, especially in March. I think that the difference in the two registers may be accounted for by the prevalence of much haziness in the atmosphere and by early hoar frosts, which would retard the burning action of the rays more than they would affect the photographic action.

I should state that the two instruments were supplied by Messrs. Negretti and Zambra; they were placed side by side on the same

stand, and exposed to the full action of the sun, at an elevation of 200 ft. above the sea-level.

The photographic charts used were prepared at different dates as indicated, but I note no difference in their relative sensitiveness. In order to determine this point satisfactorily, it would be necessary to use two photographic recorders working side by side under similar conditions, with their charts prepared at different times.

Incidentally I note, with reference to the character of the traces produced by the Campbell-Stokes recorder, that during periods of sunspots they are in a marked degree more intensely burnt than at times when there are no sunspots. I am not aware if this effect is usually noticed by observers or whether it is merely accidental.

Comparative Records of the Campbell-Stokes and Jordan Sunshine Recorders, during the Months of March and April, 1907.

Numerous large Sunspots. (*See the Campbell-Stokes charts.*)

Date.	Campbell-Stokes.	Jordan.*	Difference.	Weather Remarks.
	hours.	hours.	hours.	
Mar. 1	8·0	9·2	+1·2	Hoar frost in early morning.
,, 2	·6	·6	—	Sea fog off and on, cloudy.
,, 3	7·3	7·4	+ ·1	,, ,, fine.
,, 4	8·6	9·1	+ ·5	Early frost and light sea fog.
,, 5	8·5	8·8	+ ·3	,,
,, 6	9·1	9·2	+ ·1	Fine.
,, 7	2·7	3·3	+ ·6	Hoar frost, cloudy.
,, 8	4·5	4·0	— ·5	Cloudy.
,, 9	2·7	2·7	—	,,
,, 10	1·6	1·5	— ·1	Showery.
,, 11	7·9	7·6	— ·3	Cloudy.
,, 12	6·7	6·5	— ·2	Early frost.
,, 13	6·5	6·7	+ ·2	Fine, cloudy later.
,, 14	8·0	8·3	+ ·3	,, slightly hazy.
,, 15	·3	·3	—	Overcast and showery.
,, 16	—	—	—	Overcast all day.
,, 17	7·9	8·3	+ ·4	Fine, cloudy.
,, 18	3·9	4·8	+ ·9	Early haze and rain.
,, 19	9·1	9·3	+ ·2	Fine. Sunspots disappear.
,, 20	7·5	7·8	+ ·3	Fine.
,, 21	10·0	10·7	+ ·7	Early frost, fine.
,, 22	6·9	7·0	+ ·1	,, afternoon cloudy.
,, 23	9·4	9·8	+ ·4	Hazy in early morning.
,, 24	9·7	10·6	+ ·9	,, ,,
,, 25	8·2	9·7	+1·5	Early hoar frost and fog.
,, 26	9·4	9·6	+ ·2	,, ,, ,,
,, 27	10·7	11·2	+ ·5	Early haze, clear sunset.
,, 28	10·5	11·2	+ ·7	Hazy horizon all day.
,, 29	10·0	10·4	+ ·4	,, and sea fog all day.
,, 30	10·7	11·1	+ ·4	Hazy horizon all day.
,, 31	10·1	10·5	+ ·4	,, and sea fog.
	217·0	227·2	+10·2	

* The photographic charts used from March 1st to March 28th were prepared December 6th, 1906.

Comparative Records of the Campbell-Stokes and Jordan Sunshine Recorders during the Months of March and April, 1907—(continued).

	Date.	Campbell-Stokes.	Jordan.†	Difference.	Weather Remarks.
		hours.	hours.	hours.	
Numerous Sunspots.	April 1	9·5	9·8	+ ·3	Hazy horizon, fine.
	,, 2	9·3	9·3	—	Sea fog, fine.
	,, 3	4·4	4·5	+ ·1	Cloudy, fog and rain afternoon.
	,, 4	4·7	7·0	+2·3	Thin filmy clouds all day.
	,, 5	6·7	6·4	— ·3	Cloudy, slight haze.
	,, 6	6·4	5·7	— ·7	,, rain.
	,, 7	2·7	2·7	—	,, showery and some snow.
	,, 8	2·5	2·5	—	Showery.
	,, 9	3·8	4·6	+ ·8	Cloudy.
	,, 10	3·2	3·0	— ·2	,,
	,, 11	4·3	4·3	—	Early fog, cloudy.
	,, 12	—	—	—	Overcast, rain.
	,, 13	9·0	9·0	—	Hazy in early morning.
	,, 14	—	—	—	Overcast, rain.
	,, 15	10·0	10·5	+ ·5	Slight haze.
	,, 16	3·3	3·3	—	Sea fog, overcast.
	,, 17	8·1	8·1	—	Hazy horizon all day.
	,, 18	7·2	6·8	— ·4	Early hoar frost, cloudy.
	,, 19	4·8	4·9	+ ·1	,,
	,, 20	11·0	11·6	+ ·6	,,
	,, 21	—	—	—	Overcast, rain.
	,, 22	7·0	7·7	+ ·7	Hazy horizon, fine.
	,, 23	6·2	8·4	+2·2	,, all day.
	,, 24	11·3	11·0	— ·3	Very fine and hot.
	,, 25	1·7	1·7	—	Cloudy, overcast and rain.
	,, 26	—	—	—	Overcast and rain.
	,, 27	8·3	8·0	— ·3	Hazy horizon, cloudy later.
	,, 28	10·9	10·5	— ·4	Fine.
	,, 29	3·1	3·0	— ·1	Cloudy.
	,, 30	·4	·4	—	Overcast, showery.
	Total, April ...	159·8	164·7	+ 4·9	
	,, March..	217·0	227·2	+10·2	
	,, Mar.&Apl.	376·8	391·9	+15·1	
	Possible Sunshine, March & April,	782 hours.			
		48%	50%	+2%	

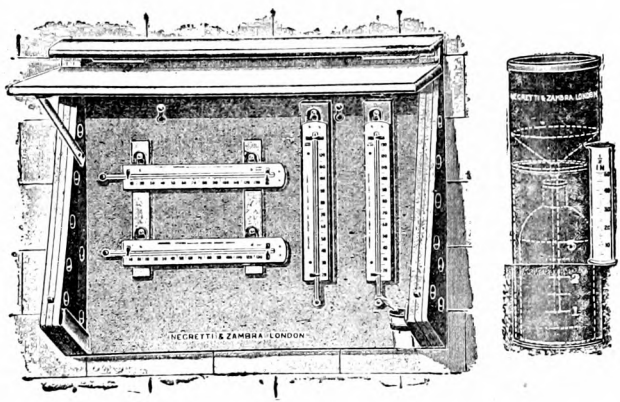
† The photographic charts used from March 29th to April 30th were prepared March 26th, 1907.

JAMES B. JORDAN.

"*Hayfield*," *Hythe, Kent, June 10th, 1907.*

A SIMPLE CLIMATOLOGICAL OUTFIT.

MESSRS. NEGRETTI AND ZAMBRA have introduced a simple set of meteorological instruments for climatological observations, intended to meet the demand for an accurate but low-priced equipment for use in schools, and for other similar purposes.



If the cost of a Stevenson screen is prohibitive, and if it is not the immediate intention of the observer to send his records to one of the Meteorological Societies or the Meteorological Office, we do not think that a better form of exposure for the thermometers could be devised than that hit upon by the makers in the "Public School Set." It is preferable, in our opinion, to the Glaisher stand which is still sometimes used, and it may be that it will prove as serviceable as the standard Stevenson screen itself.

The equipment consists of a maximum thermometer, minimum thermometer, wet bulb and dry bulb thermometers. These are hung on a board which is intended to be suspended on a north wall. The back is provided with projecting triangular sides, made of two boards held apart and pierced with holes in such a way as to admit air and exclude rain. A lid, hinged at the top, rests on these side boards when the screen is in use, and the protection is all that could be desired. When opened for reading, as shown in the illustration, the lid is supported by a moveable arm. In addition to the thermometers, the set includes a Snowdon rain gauge and graduated measure, an observation book, and a copy of "Hints to Meteorological Observers."

The instruments will all pass the Kew tests, and certificates can be supplied. We are fortunate in this country in having more than one firm of instrument makers whose name is a guarantee of the excellence of their workmanship, and no name stands higher with regard to meteorological instruments than that of the long-established firm of Negretti and Zambra.

EVAPORATION IN DESERT CONDITIONS.

We quote the following from a recent number of *Science* :—

"An exceptional opportunity for the study of evaporation in relation to climate is afforded by the Salton Sea. As our readers are aware, the sea was created by the accidental turning of the Colorado River into the Salton Basin, a dry valley in south-eastern California lying below the level of the ocean ; and now that the river has been restored to its original channel, the sea has begun to dry away. The time required for its complete dissipation is estimated at from ten to fifteen years, and during that period the accession of water from all sources will be nominal. It will thus constitute an evaporation pan on a grand scale, and the measurement of its progressive lowering will give valuable information to engineers charged with the planning of reservoirs. The matter is also of importance to meteorologists, and arrangements have been made for a joint investigation by the U.S. Weather Bureau, the U.S. Reclamation Service and the U.S. Geological Survey. To determine the relation of the evaporation to temperature, atmospheric humidity and wind, a group of meteorological stations are to be maintained in the Salton Basin ; and the endeavour will be made to develop a general formula for the estimation of evaporation in any locality where the ordinary climatic factors are known. A reconnaissance of the region has just been made by a board composed of F. H. Bigelow, C.E. Grunsky and G. K. Gilbert, representing severally the bureaus mentioned above."

THE CONDITIONS OF THE UPPER AIR IN INDIA.*

BETWEEN August 26th and September 12th, 1905, at a spot situated about nine kilometres west-north-west of Karachi and within one kilometre from the Arabian Sea, several kite flights were made preliminary to a more detailed investigation of the upper air in India by means of kites. The kites were fitted with meteorographs and some of the results of the actual flights are here epitomized :—

(1). The highest flight occurred on August 28th, when an altitude of 1,380 metres was reached.

(2). A nearly saturated stratum of air from the sea extended from the ground 10 metres above sea level, upwards to an altitude of 500 metres on August 27th, 800 metres on August 28th, 1,130 metres on August 31st, and 600 metres on September 12th.

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* An abstract from an account of the preparations made for determining the conditions of the upper air in India by means of kites.

Memoirs of the Indian Meteorological Department ; Vol. XX., Part 1 ; Calcutta. Published under the direction of Gilbert T. Wheeler, M.A., Sc.D., F.R.S., Meteorological Reporter to the Government of India.

[We regret that this notice has been standing in type for a very long time, but on the principle of "better late than never," we think it would be worse to cancel it than to print it.—ED. *M.M.*]

(3). Above the nearly saturated stratum a very dry wind of relative humidity about 10 per cent. was encountered; as the zero of the humidity scale of the meteorograph changed rapidly as the kite entered this dry current some uncertainty, however, attached to the actual readings in the current, the uncertainty being estimated as representing an error of as much as 10 per cent.

(4). This dry upper current, which was of land origin, exhibited at the levels reached by the kites very rapid diurnal variations of temperature, which are considered too great to be due to variations in the direct absorption of solar radiation.

(5). The changes occurring in the dry upper land current were concluded to have been much larger and more rapid than those in the lower moist sea current.

(6). It seems probable that the moist lower current was of the dimensions of a sea breeze, whereas the dry upper current formed part of a large air movement.

In this report coloured plates are produced indicating for the hours of 8 and 10 a.m. in August and September the normal wind directions and pressure distribution over the Indian Empire. From these it is seen that towards midday in August a well marked cyclonic circulation developes over the heated desert tracts of north-west India; but the most remarkable fact which the plates show is the relatively great change in the pressure distribution that occurs between 8 and 10 a.m., indicating how prominent diurnal changes are in tropical countries.

In our part of the world changes in the distribution of atmospheric pressure due to the time of day are so insignificant that they are completely obscured by those due to the time of year, but more especially by those which in our ignorance as to their causes we may describe as accidental.—L. C. W. B.

METEOROLOGICAL NEWS AND NOTES.

THE ROYAL METEOROLOGICAL SOCIETY organised an interesting Meteorological Exhibit in connection with the Agricultural Education and Forestry Section of the Royal Agricultural Society's recent Show at Lincoln. The exhibit was attractively arranged, and was intended to illustrate the Society's work in diffusing a knowledge of meteorology. Various patterns of self-recording and other instruments were shown, together with specimens of lightning conductors and objects damaged by lightning. Diagrams relating to rainfall, temperature, sunshine, the influence of weather on crops, health and such matters, and a collection of photographs illustrating meteorological phenomena were also exhibited. A fully equipped Climatological Station, with the various instruments in position, was arranged in a railed-off enclosure in the grounds, and lectures were given by Mr. W. Marriott on "Meteorology in Relation to Agriculture."

THE DEATH OF MR. J. M. PHILLPOTT, F.R.Met.Soc., on July 17th, removed the chief assistant in the office of *British Rainfall* and of this Magazine. Mr. Phillpott, after several years in the office of the Royal Meteorological Society, joined the staff of the British Rainfall Organization in November, 1899, a few months before the death of Mr. Symons, and he rapidly mastered the complicated details of the work, in which year by year he took an increasing share. Mr. Phillpott was a singularly accurate worker, and his keen interest in all that concerned meteorological work, combined with his pleasant unassuming manner, made him a valued friend of everyone with whom he worked. Much of his work was in connection with this Magazine. Mr. Phillpott, who was 34 years of age, leaves a widow and two young children.

TWO METEOROLOGICAL OFFICE APPOINTMENTS have been intimated. Mr. R. H. Curtis has been appointed Superintendent of the Instruments Branch, with which the Observatories Branch will be incorporated. Mr. Richard Corless, B.A., Sidney Sussex College, Cambridge, has been appointed Special Assistant to the Director.

THE INTERNATIONAL INVESTIGATIONS IN THE UPPER ATMOSPHERE, which are carried out monthly at the same time at the kite and balloon observatories in different parts of Europe, were conducted on an extended scale in the last week of July. On that occasion not only were observations made at the regular stations, but also at sea in various parts of the northern hemisphere, and at supplementary stations on shore. The Royal Meteorological Society and the Kite Committee of the British Association secured observations with free balloons at several stations, particulars of which we hope to give in an early number.

NEWSPAPER WRITERS, and even some scientific men, in calling attention to the causes of the very wet summer of 1907, have given reasons which in some cases seemed very convincing, only it so happens that the summer, or the year so far as it has gone, has not been very wet at all! Up to the end of July the rainfall for the British Isles as a whole was normal.

Errata.—In the supplementary table of rainfall last month the rainfall for June at Plynlimon was given as 1·53 in., the figure ought to have been 15·25 in., and as this is an exceptionally heavy fall, even at so wet a station, we should be glad if our readers would make the correction in their copies. Mr. Denning asks us to correct the date of the cold day mentioned on p. 111 in the July number, from "July 14th, 1876," which is an error, to "July 14th, 1875," which is corrected.

TEMPERATURE FOR JULY, 1907.

STATION.	COUNTY.	Lat. N.	Long. W. [*E.]	Height above Sea. ft.	TEMPERATURE. Max. °	Max. Date.	Min. °	Min. Date.	No. of Night at or below 32° Shade.	Grass.
Camden Square	*London*	51 32	0 8	111	80·7	15	42·3	11	0	0
Tenterden	*Kent*	51 4	*0 41	190	74·5	15	42·0	11	0	0
West Dean	*Hampshire*	51 3	1 38	137	77·0	15,20	38·0	11	0	3
Hartley Wintney	,,	51 18	0 53	222	82·0	20,21	42·0	13	0	...
Hitchin	*Hertfordshire*	51 57	0 17	238	75·0	20	39·0	11	0	...
Winslow (Addington)	*Buckinghamshr.*	51 58	0 53	309	78·0	19	38·0	11	0	0
Bury St. Edmunds (Westley)	*Suffolk*	52 15	*0 40	226	75·5	27,29	40·0	11	0	...
Brundall	*Norfolk*	52 37	*1 26	66	73·2	29	40·2	23	0	0
Winterbourne Steepleton	*Dorset*	50 42	2 31	316	76·8	17	39·0	8,13	0	0
Torquay (Cary Green)	*Devon*	50 28	3 32	12	77·3	17	44·9	11	0	...
Polapit Tamar [Launceston]	,,	50 40	4 22	315	57·9	26	36·1	11	0	0
Bath	*Somerset*	51 23	2 21	67	80·0	20	41·0	12	0	...
Stroud (Upfield)	*Gloucestershire*	51 44	2 13	226	80·0	20	45·0	11	0	...
Church Stretton (Woolstaston)	*Shropshire*	52 35	2 48	800	77·5	19	34·0	1,2,3	0	...
Coventry Kingswood	*Warwickshire*	52 24	1 30	340	75·0	20	43·0	3	0	...
Boston	*Lincolnshire*	52 58	0 1	25	75·0	16	40·0	11	0	...
Worksop (Hodsock Priory)	*Nottinghamshire*	53 22	1 5	56	75·7	16,18	37·3	1	0	3
Derby (Midland Railway)	*Derbyshire*	52 55	1 28	156	80·0	17,18	38·0	11	0	0
Bolton (Queen's Park)	*Lancashire*	53 35	2 28	390	77·1	17	39·6	1	0	0
Wetherby (Ribston Hall)	*Yorkshire, W.R.*	53 59	1 24	130	...	...	...	...	...	...
Arncliffe Vicarage	,, ,,	54 8	2 6	732	...	...	...	...	...	...
Hull (Pearson Park)	,, *E.R.*	53 45	0 20	6	76·0	28	40·0	11	0	...
Newcastle (Town Moor)	*Northumberland*	54 59	1 38	201	...	...	...	...	...	...
Borrowdale (Seathwaite)	*Cumberland*	54 30	3 10	423	81·7	18	41·5	2	0	...
Cardiff (Ely)	*Glamorgan*	51 29	3 13	53	...	...	...	...	...	...
Haverfordwest (High Street)	*Pembroke*	51 48	4 58	95	80·2	18,20	42·5	12	0	...
Aberystwyth (Gogerddan)	*Cardigan*	52 26	4 1	83	85·0	20	33·0	10	0	...
Llandudno	*Carnarvon*	53 20	3 50	72	76·0	17	46·2	4	0	...
Cargen [Dumfries]	*Kirkcudbright*	55 2	3 37	80	81·4	16	40·0	2,11	0	...
Lilliesleaf (Riddell House)	*Roxburgh*	55 31	2 46	550	...	..	...	...	...	...
Edinburgh (Royal Observy.)	*Midlothian*	55 55	3 11	442	77·1	16	42·8	7	0	0
Girvan (Pinmore)	*Ayr*	55 10	4 49	207	84·0	17	41·0	1,11	0	0
Glasgow (Queen's Park)	*Renfrew*	55 53	4 18	144	78·0	17	41·0	6	0	3
Tighnabruaich	*Argyll*	55 55	5 14	50	74·0	17	38·0	6	0	...
Mull (Quinish)	,,	56 36	6 13	35	81·0	20	...	...	...	...
Dundee (Eastern Necropolis)	*Forfar*	56 28	2 57	199	83·0	16	40·0	7	0	...
Braemar	*Aberdeen*	57 0	3 24	1114	...	...	...	...	...	...
Aberdeen (Cranford)	,,	57 8	2 7	120	74·0	15,16	40·0	6	0	...
Cawdor (Budgate)	*Nairn*	57 31	3 57	250	...	...	...	...	...	...
Invergarry	*E. Inverness*	57 4	4 47	13c?	...	...	...	...	...	...
Loch Torridon (Bendamph)	*W. Ross*	57 32	5 32	20	...	...	...	...	...	...
Dunrobin Castle	*Sutherland*	57 59	3 56	14	69·0	16	42·0	9	0	...
Castletown	*Caithness*	58 35	3 23	100	74·0	15	36·0	18	0	0
Killarney (District Asylum)	*Kerry*	52 4	9 31	178	85·0	19	39·0	11	0	...
Waterford (Brook Lodge)	*Waterford*	52 15	7 7	104	80·0	17,18	39·0	5	0	...
Broadford (Hurdlestown)	*Clare*	52 48	8 38	167	81·0	22	40·0	10	0	...
Abbey Leix (Blandsfort)	*Queen's County*	52 56	7 17	532	80·0	19	...	...	...	...
Dublin (Fitz William Square)	*Dublin*	53 21	6 14	54	77·3	17	43·8	11	0	0
Ballinasloe	*Galway*	53 20	8 15	160	85·2	17	36·0	2	0	...
Clifden (Kylemore House)	,,	53 32	9 52	105	...	...	...	...	...	...
Crossmolina (Enniscoe)	*Mayo*	54 4	9 18	74	...	...	...	...	...	...
Seaforde	*Down*	54 19	5 50	180	88·0	17	40·0	10	0	...
Londonderry (Creggan Res.)	*Londonderry*	54 59	7 19	320	...	...	...	...	...	...
Omagh (Edenfel)	*Tyrone*	54 36	7 18	280	...	..	...	...	...	...

RAINFALL FOR JULY, 1907.

RAINFALL OF MONTH.							RAINFALL FROM JAN. 1.					
Aver. 1870-99.	1907.	Diff. from Av.	% of Av.	Max. in 24 hours.		No. of Days	Aver. 1870-99.	1907.	Diff. from Aver.	% of Av.	Mean Annual 1870-1899.	STATION.
in.	in.	in.		in.	Date.		in.	in.	in.		in.	
2·49	1·96	— ·53	79	·61	22	15	13·12	12·00	— 1·12	91	25·16	Camden Square
2·26	1·20	—1·06	53	·32	30	14	13·81	11·36	— 2·45	82	28·36	Tenterden
2·62	1·45	—1·17	55	·47	21	13	15·23	12·20	— 3·03	80	29·93	West Dean
2·38	1·47	— ·91	62	·46	21	14	13·97	12·95	— 1·02	93	27·10	Hartley Wintney
2·55	1·82	— ·73	71	·36	10	17	12·81	12·82	+ ·01	100	24·66	Hitchin
2·77	1·94	— ·83	70	·52	4	15	14·05	13·06	— ·99	93	26·75	Addington
2·91	1·76	—1·15	60	·56	10	13	13·23	13·97	+ ·74	106	25·39	Westley
2·70	1·30	—1·40	48	·51	30	12	12·82	14·87	+ 2·05	116	25·40	Brundall
2·78	1·27	—1·51	46	·29	3	12	19·14	16·18	— 2·96	85	39·00	Winterbourne Stpltn
2·73	1·98	— ·75	73	·88	2	16	17·78	15·18	— 2·60	85	35·00	Torquay
2·93	1·56	—1·37	53	·35	2	16	18·38	17·27	— 1·11	94	38·85	Polapit Tamar
2·83	4·80	+1·97	170	2·69	21	14	15·86	16·92	+ 1·06	107	30·75	Bath
2·90	4·33	+1·43	149	2·18	22	16	15·73	15·68	— ·05	100	29·85	Stroud
2·66	3·08	+ ·42	116	·54	22	19	16·97	17·94	+ ·97	106	33·04	Woolstaston
2·75	2·96	+ ·21	108	·83	21	17	15·31	15·10	— ·21	99	29·21	Coventry
2·44	1·61	— ·83	66	·25	22	13	12·20	11·20	— 1·00	92	23·30	Boston
2·51	1·43	—1·08	57	·38	10	16	13·32	11·80	— 1·52	89	24·70	Hodsock Priory
2·63	2·67	+ ·04	102	·71	21	18	14·11	15·78	+ 1·67	112	26·18	Derby
4·12	3·77	— ·35	91	·90	21	21	20·87	26·51	+ 5·64	127	42·43	Bolton
2·61	1·77	— ·84	68	·49	30	18	14·24	14·83	+ ·59	104	26·96	Ribston Hall
4·97	3·15	—1·82	63	·37	8,26	20	31·44	36·21	+ 4·77	115	60·96	Arncliffe Vic.
2·50	1·41	—1·09	56	·23	5, 8	14	13·74	13·71	— ·03	100	27·02	Hull
2·91	1·74	—1·17	60	·25	3, 29	17	14·26	13·68	— ·58	96	27·99	Newcastle
9·37	4·28	—5·09	46	1·18	7	15	66·73	67·46	+ ·73	101	132·68	Seathwaite
3·52	2·66	— ·86	76	·60	4	17	20·71	19·46	— 1·25	94	42·81	Cardiff
3·70	2·17	—1·53	59	·45	24	16	23·37	21·09	— 2·28	90	47·88	Haverfordwest
4·27	4·44	+ ·17	104	·75	4	15	21·86	25·49	+ 3·63	117	45·41	Gogerddan
2·61	2·28	— ·33	87	·63	24	16	14·79	12·84	— 1·95	87	30·98	Llandudno
3·30	1·71	—1·59	52	·38	12	13	22·05	26·00	+ 3·95	118	43·43	Cargen
3·26	...	...	...	...	...	..	17·14	...	...	...	33·04	Riddell House
...	2·49	..	...	·77	4	14	...	12·64	...	...	...	Edinburgh
3·60	3·21	— ·39	89	1·08	12	19	24·12	...	...	...	48·87	Girvan
3·36	2·80	— ·56	83	·73	12	15	18·30	21·78	+ 3·48	119	35·80	Glasgow
4·33	5·01	+ ·68	116	1·67	12	14	28·98	33·78	+ 4·80	117	57·90	Tighnabruaich
4·38	2·83	—1·55	65	·95	12	17	28·22	27·76	— ·46	98	57·53	Quinish
3·03	2·30	— ·73	76	·75	7	18	15·12	16·30	+ 1·18	108	28·95	Dundee
2·89	1·65	—1·24	57	...	...	...	17·83	17·45	— ·38	98	36·07	Braemar
3·02	1·88	—1·14	62	·43	7	16	16·71	16·84	+ ·13	101	33·01	Aberdeen
3·34	2·65	— ·69	79	·44	9	12	15·26	18·12	+ 2·86	119	29·37	Cawdor
3·78	2·48	—1·30	66	·60	12	11	28·50	34·10	+ 5·60	120	56·00	Invergarry
6·46	5·11	—1·35	79	·75	10	18	42·50	55·37	+12·87	130	86·50	Bendamph
2·82	1·57	—1·25	56	·33	9	12	16·27	20·11	+ 3·84	124	31·60	Dunrobin Castle
...	1·19	...	...	·20	4	19	...	18·05	...	...	...	Castletown
3·99	2·32	—1·67	58	·37	3	19	29·98	21·30	— 8·68	71	58·11	Killarney
3·10	3·04	— ·06	98	1·26	24	16	20·29	18·62	— 1·67	92	39·30	Waterford
2·94	2·51	— ·43	85	·53	13	18	17·06	18·61	+ 1·55	109	33·47	Hurdlestown
3·05	4·19	+1·14	137	·85	22	20	18·25	19·86	+ 1·61	109	35·19	Abbey Leix
2·63	2·02	— ·61	77	·46	3	19	14·51	14·35	— ·16	99	27·75	Dublin
3·31	2·89	— ·42	87	·52	22	22	19·23	20·65	+ 1·42	107	37·04	Ballinasloe
6·15	4·16	—1·99	68	1·02	3	13	40·44	35·19	— 5·25	87	80·23	Kylemore House
3·59	2·43	—1·16	68	·48	10	20	25·33	28·56	+ 3·23	113	50·50	Enniscoe
3·40	2·23	—1·17	66	·40	2, 12	13	20·32	22·85	+ 2·53	112	38·61	Seaforde
3·47	3·84	+ ·37	111	·90	12	19	20·54	29·74	+ 9·20	145	41·20	Londonderry
3·39	...	...	...	...	...	...	19·25	...	...	...	37·85	Omagh

SUPPLEMENTARY RAINFALL, JULY, 1907.

Div.	STATION.	Rain inches	Div.	STATION.	Rain. inches
II.	Abinger Hall	1·65	XI.	Rhayader, Tyrmynydd	4·72
,,	Ramsgate	1·69	,,	Lake Vyrnwy	3·55
,,	Hailsham	1·42	,,	Llangyhanfal, Plâs Draw	2·10
,,	Crowborough, Uckfield Lodge	2·24	,,	Criccieth, Talarvor	1·84
,,	Totland Bay, Aston House.	...	,,	Llanberis, Pen-y-pass	5·53
,,	Emsworth, Redlands	1·45	,,	Lligwy	2·00
,,	Alton, Ashdell	1·55	,,	Douglas, Woodville	1·81
,,	Newbury, Welford Park	2·35	XII.	Stoneykirk, Ardwell House	2·42
III.	Harrow Weald, Hill House.	2·37	,,	Dalry, The Old Garroch	2·77
,,	Oxford, Magdalen College	3·06	,,	Langholm, Drove Road	2·76
,,	Bloxham Grove	2·07	,,	Moniaive, Maxwelton House	1·85
,,	Pitsford, Sedgebrook	2·46	XIII.	N. Esk Reservoir [Penicuick]	3·35
,,	Huntingdon, Brampton	1·93	XIV.	Maybole, Knockdon Farm	2·25
,,	Wisbech, Bank House	2·10	XV.	Campbeltown, Witchburn	3·00
IV.	Southend Water Works	1·02	,,	Inveraray, Newtown	3·56
,,	Colchester, Lexden	2·59	,,	Ballachulish House	3·70
,,	Newport, The Vicarage	2·36	,,	Islay, Eallabus	3·72
,,	Rendlesham	2·36	XVI.	Dollar Academy	3·19
,,	Swaffham	1·74	,,	Loch Leven Sluice	2·50
,,	Blakeney	1·50	,,	Balquhidder, Stronvar	2·34
V.	Bishops Cannings	2·30	,,	Perth, Pitcullen House	2·34
,,	Ashburton, Druid House	2·73	,,	Coupar Angus Station	2·36
,,	Okehampton, Oaklands	3·37	,,	Blair Atholl	1·66
,,	Hartland Abbey	1·60	,,	Montrose, Sunnyside Asylum	2·02
,,	Lynmouth, Rock House	1·32	XVII.	Alford, Lynturk Manse	2·30
,,	Probus, Lamellyn	1·94	,,	Keith Station	3·39
,,	Wellington, The Avenue	1·73	XVIII.	N. Uist, Lochmaddy	1·39
,,	North Cadbury Rectory	1·88	,,	Alvey Manse	1·72
VI.	Clifton, Pembroke Road	2·72	,,	Loch Ness, Drumnadrochit.	2·24
,,	Ross, The Graig	2·14	,,	Glencarron Lodge	4·19
,,	Shifnal, Hatton Grange	2·51	,,	Fearn, Lower Pitkerrie	2·56
,,	Cheadle, The Heath House.	2·80	XIX.	Invershin	1·33
,,	Blockley, Upton Wold	3·10	,,	Altnaharra	1·64
,,	Worcester, Boughton Park.	2·54	,,	Bettyhill	1·29
VII.	Market Overton	2·72	XX.	Dunmanway, The Rectory	2·17
,,	Market Rasen	1·88	,,	Cork	2·20
,,	Bawtry, Hesley Hall	2·21	,,	Darrynane Abbey	2·36
VIII.	Neston, Hinderton Lodge	2·04	,,	Glenam [Clonmel]	2·58
,,	Southport, Hesketh Park	1·78	,,	Ballingarry, Gurteen	3·27
,,	Chatburn, Middlewood	2·43	,,	Miltown Malbay	3·38
,,	Cartmel, Flookburgh	2·89	XXI.	Gorey, Courtown House	3·23
IX.	Langsett Moor, Up. Midhope	2·34	,,	Moynalty, Westland	2·28
,,	Scarborough, Scalby	1·03	,,	Athlone, Twyford	1·83
,,	Ingleby Greenhow	1·69	,,	Mullingar, Belvedere	2·16
,,	Mickleton	2·21	XXII.	Woodlawn	3·71
X.	Bardon Mill, Beltingham	2·28	,,	Westport, Murrisk Abbey	...
,,	Ewesley, Fallowlees	1·90	,,	Collooney, Markree Obsy	2·88
,,	Ilderton, Lilburn Cottage	2·39	,,	Mohill	2·89
,,	Keswick, York Bank	1·83	XXIII.	Enniskillen, Portora	...
XI.	Llanfrechfa Grange	3·30	,,	Warrenpoint, Summer Hill.	1·40
,,	Treherbert, Tyn-y-waun	5·54	,,	Banbridge, Milltown	3·12
,,	Carmarthen, The Friary	2·94	,,	Belfast, Springfield	2·92
,,	Castle Malgwyn [Llechryd].	1·78	,,	Bushmills, Dundarave	3·24
,,	Plynlimon	7·20	,,	Stewartstown, The Square	2·64
,,	Crickhowell, Ffordlas	3·60	,,	Killybegs	4·06
,,	New Radnor, Ednol	3·71	,,	Horn Head	2·76

METEOROLOGICAL NOTES ON JULY, 1907.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Temp. for Temperature; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; TS for Thunderstorm; R for Rain; H for Hail; S for Snow.

LONDON, CAMDEN SQUARE.—Cool and cloudy throughout; the max. shade temp. touched 80° on one day only, and failed to reach 70° on 17 occasions. Mean temp. 60°·1, or 3°·2 below the average. Duration of sunshine 162·6* hours, and of R 23·8 hours. Sharp TS on 10th, and heavy T on 22nd.

CROWBOROUGH.—Unseasonable weather with unusually low temp., and only an occasional warm day. Mean temp. 57°·1, or 4°·4 below the average. R ·49 in. below the average of 36 years. Several TSS, severe on 22nd and 30th.

HARTLEY WINTNEY.—Cloud and low temp. prevailed throughout, and there was no summer weather. The rough wind of June continued till 10th.

TORQUAY.—Duration of sunshine 236·6* hours, or 11·0 hours above the average. Mean temp. 58°·9, or 2°·9 below the average.

CLIFTON.—Very wet and cold till 8th, but fine and hot from 11th to 20th. Heavy TS on 21st, and afterwards dull and cool. R ·22 in. below the average.

STROUD.—Severe TSS on 21st and 22nd. On the latter day 1·16 in. fell between 3 and 4.30 p.m., and another 1·00 in. from 4.30 to 5.30 p.m. A heifer was killed by L, and a belfry in Stroud and a tree close by were struck.

WORCESTER.—About ten days of fine weather from 10th, with temp. well above 80° from 15th to 21st, but otherwise cool and stormy, with cold nights. Severe TS on 21st, and two houses struck by L.

BOLTON.—Generally very unsettled with low temp. The only summer-like weather was between 11th and 19th, when most of the sunshine was recorded. Mean temp. 55°·2, or 1°·3 below the average. Duration of sunshine 109·8* hours, or 42·9 hours below the average. Severe TS on 21st.

SOUTHPORT.—Dry and normally sunny, yet, but for a warm period during the third week, unusually cold. Mean temp. 57°·7, or 2°·0 below the average. Duration of sunshine 213 hours, or 1 hour above the average. R 1·21 in. below the average, but subsoil water and brooks were at an exceptionally high level. Duration of R 36·0 hours. TSS on 4th, 21st and 22nd, the last occasioning serious damage.

ABERYSTWYTH.—Heavy R from 1st to 9th, with little sun; splendid weather from 9th to 22nd, after which it completely broke up.

DOUGLAS.—Dry and quiet, and a great improvement on the previous months, although unseasonably cold in the first fortnight and last week. Beautiful summer weather with high temp. from 14th to 23rd.

DUMFRIES.—The wet weather of June continued till 13th, when dry warm weather succeeded, effecting a marvellous change in farm and garden.

MULL, QUINISH.—The cold sunless weather ended abruptly with heavy R on 12th, and the following 11 days of sunshine and heat entirely altered the agricultural situation, so that the year promised to be a good one.

COUPAR ANGUS.—R ·59 in. above the average; and mean temp. 56°·6, or 0°·7 below the average. With the exception of five days from 13th, it was like May and June, both cold and wet.

DRUMNADROCHIT.—R ·58 in., and rain days 2, below the average of 21 years.

MILTOWN MALBAY.—Until St. Swithin's day it was unnaturally cold and rainy, but this ended with heavy R on 12th and 13th, and torrid heat continued almost to the end.

DUBLIN.—Cold and broken at first, but warm from 12th to 21st, and thundery from 20th to 22nd; afterwards unsettled, showery and gusty. Mean temp. 59°·6, or 0°.9 below the average.

BANBRIDGE.—On 19th H stones fell six inches in circumference, and weighing more than an ounce each.

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* Campbell-Stokes.

Climatological Table for the British Empire, February, 1907.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Date.	Absolute. Minimum. Temp.	Date.	Average. Max.	Min.	Dew Point.	Humidity.	Absolute. Max. in Sun.	Max. on Grass.	Total Rain. Depth.	Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
London, Camden Square	52·0	17	23·4	24	43·0	32·7	34·4	87	80·1	20·9	1·17	13	...
Malta	...	...	...	...	...	...	...	...	...	...	...	...	...
Lagos	96·0	15	71·0	13	88·1	75·9	75·0	77	151·0	67·5	·20	4	6·7
Cape Town	89·8	4	54·7	20	78·4	60·5	59·0	71	...	...	·23	5	3·3
Durban, Natal ...	90·0	19	64·1	14	84·1	69·6	...	...	147·2	...	4·06	16	1·1
Johannesburg	79·9	9	51·8	14	73·1	56·4	57·2	82	158·4	49·5	6·25	15	5·4
Mauritius	88·3	2*	67·0	?	85·8	72·2	69·4	74	151·2	61·4	2·75	15	6·4
Calcutta...	88·0	27	51·4	10	82·6	61·5	59·6	67	146·9	45·0	·09	1	2·8
Bombay...	88·7	28	63·3	1	83·7	69·9	65·0	69	132·1	54·9	·27	1	0·4
Madras	91·4	24	63·6	13	86·2	68·4	68·6	77	142·0	63·4	·00	0	2·0
Kodaikanal	72·0	13	44·9	10	67·6	47·6	42·2	59	130·3	30·3	·00	0	2·6
Colombo, Ceylon ...	92·4	9	70·2	14,15	87·6	72·8	70·5	73	151·8	64·0	3·85	7	3·3
Hongkong	67·8	28	46·7	21	61·8	55·2	51·2	75	125·5	...	·17	2	8·0
Melbourne	103·8	25	45·2	10	75·3	53·8	50·7	64	154·6	38·1	·66	3	3·8
Adelaide	105·2	24	50·0	18	88·8	63·1	50·4	40	154·7	43·4	·19	3	2·5
Coolgardie	106·5	2	52·0	17	90·7	63·5	55·3	48	176·9	49·5	·98	3	2·6
Sydney	88·9	14	59·9	19	76·9	63·8	60·6	71	127·5	50·2	2·57	16	6·1
Wellington	77·2	16	49·4	27	69·3	57·9	54·6	73	128·0	40·0	3·94	9	6·0
Auckland	78·0	8	56·0	25	72·9	61·1	55·7	65	144·0	52·0	5·79	10	5·3
Jamaica, Negril Point.	85·9	24	61·0	2	83·0	66·6	65·1	72	...	...	·68	4	...
Trinidad	91·0	14	63·0	1	85·3	66·8	68·3	77	160·0	61·0	·44	5	...
Grenada	87·0	9	69·0	5	82·7	71·1	67·9	72	152·0	...	2·54	18	3·0
Toronto	41·0	13	- 6·1	12	26·1	10·2	12·7	81	49·0	-11·5	·15	3	6·2
Fredericton	39·0	14	-25·5	24	20·0	-2·9	...	77	...	...	·00	0	5·2
St. John's, N.B. ...	43·3	15	-11·3	23	25·2	6·2	...	...	...	...	1·07	2	5·6
Victoria, B.C.	53·1	19	25·5	3	46·4	37·0	...	...	...	...	3·89	14	7·7
Dawson	45·0	15	-55·0	22	-18·2	-34·1	...	...	...	...	·00	0	5·5

* and 16, 26.

Johannesburg.—Bright sunshine 199·9 hours.

Mauritius.—Mean temp. of air 0°·3, dew point 1°·5, relative humidity 3·5 per cent., and R 3·90 in. below, averages. Mean hourly velocity of wind 8·5 miles, or 2·5 below average.

MADRAS.—Mean temp. of the air slightly above the average.

KODAIKANAL.—Bright sunshine 249 hours.

COLOMBO.—Mean temp. of air 80°·2 or same as average, of dew point 70°·5 or same as average, and R 1·74 in. above average. Mean hourly velocity of wind 6·3 miles.

HONGKONG.—Mean temp. of air 58°·7. Bright sunshine 96·5 hours. R 1·70 in. below average. Mean hourly velocity of wind 15·3 miles.

Adelaide.—Mean temp. of air 2°·0 above, and R ·41 in. below, averages.

Sydney.—Mean temp. of air 0°·7 below, and R 2·11 in. below, averages.

Wellington.—Mean temp. of air 1°·2 above, and R ·60 in. above averages.

Auckland.—Mean temp. of air close to average. Rainfall largely in excess of average.

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THE DISTRIBUTION OF BRIGHT SUNSHINE OVER THE BRITISH ISLES.

By Richard H. Curtis.

Before proceeding to discuss the average distribution of "bright" sunshine over the British Islands, it may be useful to try first of all to define what "bright sunshine" is. At first sight this may appear to be a very simple matter, but, as a matter of fact, in this as in many similar cases the question is more easily asked than answered.

At the outset we are met with a difficulty, arising from the fact that the sun's rays present a complex phenomenon about which there is still a good deal to learn. They differ very much in wave-length, and, therefore, the effects they are capable of producing are very varied also; and it must be remembered that it is only by their effects that the different rays can be identified and their intensity measured. Besides this, the number of rays of a given wave-length appears to bear no fixed relation to the number of rays of any other wave-length, but on the contrary their proportions are constantly changing, owing to the process of absorption to which the rays become subjected when they enter the atmosphere. The extent to which this absorption occurs depends upon the humidity of the air, and even more upon the presence of dust particles, by which the rays of shorter wave-length are stopped, while the longer ones continue to pass more or less freely. The dust particles also form nuclei for the condensation of the aqueous vapour, and when water becomes deposited upon them their obstructive power is greatly increased, until the point being reached at which a cloud is formed no *direct* solar rays can pass at all.

In dealing with the rays emitted by the sun, we may regard them from three points of view: we may consider the amount of light they bring us, or their heat, or the energy of their chemical action. For meteorological purposes, the most important solar radiations are without doubt the heat rays, for it is they that chiefly, if not entirely, affect the movements of our atmosphere. The chemical, or actinic, rays, and also the light rays, play an important part in the economy of animal and vegetable life, and so come within the scope of applied meteorology, and, therefore, they too ought to be included in any

record purporting to completely represent the sun's radiations. Up to now, however, no instrument has been devised which will satisfactorily supply such a complete record; and, therefore, when we wish to register the intensity of the solar action, we have first to decide whether for the particular purpose in view it is most desirable to record the intensity of the solar *heat*, or of the sun's *light*, or of its *actinic* rays.

For some years meteorological observers were somewhat divided upon the relative merits of the first and third of these groups; less probably because they had any doubt as to which was, meteorologically, the mose important, than because the record of the actinic rays could be more easily got, and also, perhaps, some may have thought that those rays afforded a truer approximation to the intensity of the whole solar radiation than the record of solar heat could supply.

Two forms of recorder have, therefore, been in use for recording "bright sunshine":—one in which the intensity of the actinic radiation is recorded by means of photography; the other a "burning" recorder, in which the focussed heat rays write their record upon a strip of card.

As might be expected from what has just been said, these two records frequently differ a good deal from each other, and the difference is not always in the same direction. Sometimes it is the photographic recorder which registers the greater record, and at other times its record is considerably less than that of the burning recorder. The opinion was at one time rather generally held that the photographic record *always* exceeded the other; but that idea was based chiefly upon some very unsatisfactory figures, published some ten or twelve years ago, as the result of a comparison which has been shown to have been worthless.* Since then, several prolonged comparisons of the records by the two styles of instrument have been carried out, and the general result has been to show that the differences from day to day nearly balance each other over the longer period of a month, and that the yearly amounts of bright sunshine recorded by both are practically alike.†

For the sake of uniformity, however, and in order that records from all places however widely separated, and for short as well as for long periods, may be satisfactorily compared, it became necessary to decide finally which of the two forms of recorder should be adopted as the standard for meteorological purposes, and Dr. Shaw, F.R.S., the Director of the Meteorological Office, has decided that for the official publications of his department, and from the beginning of the year 1906, only the records of the burning recorder shall be employed.

Briefly described, the burning recorder consists of a sphere of

* See *Quart. Journ. Roy. Met. Soc.*, Vol. **24**, p. 1.

† Such comparisons have been made by Mr. March, F.R.Met.Soc., at Torquay: Mr. Cresswell, at Edgbaston; and especially by Mr. Baxendell, F.R.Met.Soc., at Southport.

crown glass, four inches in diameter, which is placed upon a pedestal centrally in a metal frame designed to carry a strip of coloured card. The sun's rays passing through the lens are focussed upon the card, and if the heat rays are of sufficient intensity they burn it, the burn varying from a faint discoloration with weak sunshine to a clean burn right through the card when the sun shines with greater force.

Here then we reach a definite standard, which enables us to give an arbitrary, but at the same time a perfectly reasonable, definition of "bright sunshine," which may be definined as beginning when the radiation of solar heat beams sufficient to at least char a strip of coloured card, after the sun's rays have been passed through a spherical lens under the conditions just described. It is the direct solar radiation covered by this definition, whose distribution over the British Isles I now proceed to discuss.

The sunshine recorder first took its place as a meteorological instrument for general use in the year 1880, and there are now available more than twenty-five years' observations for a few places, and series covering shorter periods for a large and steadily increasing number. There are, however, unfortunately still many parts of the Kingdom for which at present no data are forthcoming. In constructing the map which accompanies this article, I have used the averages published by the Meteorological Office, to which I have added others which have been derived from various sources, weighting them as far as possible for the length of the period they cover.

There are two ways in which the records of bright sunshine may be dealt with:—we may consider the actual number of hours recorded, or we may regard that number as a percentage of the time during which the sun remained above the horizon of the place of observation; or, in other words, as a percentage of the total amount of sunshine possible, supposing the sun to have been shining without obstruction from sunrise to sunset. Obviously, latitude is also an important factor in the record, because the heating power of the sun's rays is directly influenced by the sun's altitude; but so far it has not been customary to take this into account, nor to make any allowance for the obstruction of the sun's rays caused by physical features of the surrounding district, such as high hills; in the accompanying map the average number of hours recorded at the several stations has been used in drawing the "isohels."

The sunniest parts of the United Kingdom are the most southern, the annual total of hours' duration decreasing as we proceed northward, from 1,900 hours in the Channel Islands to only 1,200 hours over the north of Scotland. The lines of equal duration show, however, a strong tendency to follow the lines of the coast both in the east and the west, and this feature is well shown by the stations adjacent to the St. George's Channel. A large part of the central area of England, and of the south-west of Scotland, is adversely influenced by the smoke and dust of the large manufacturing centres, which becoming dispersed through the atmosphere to leeward screens

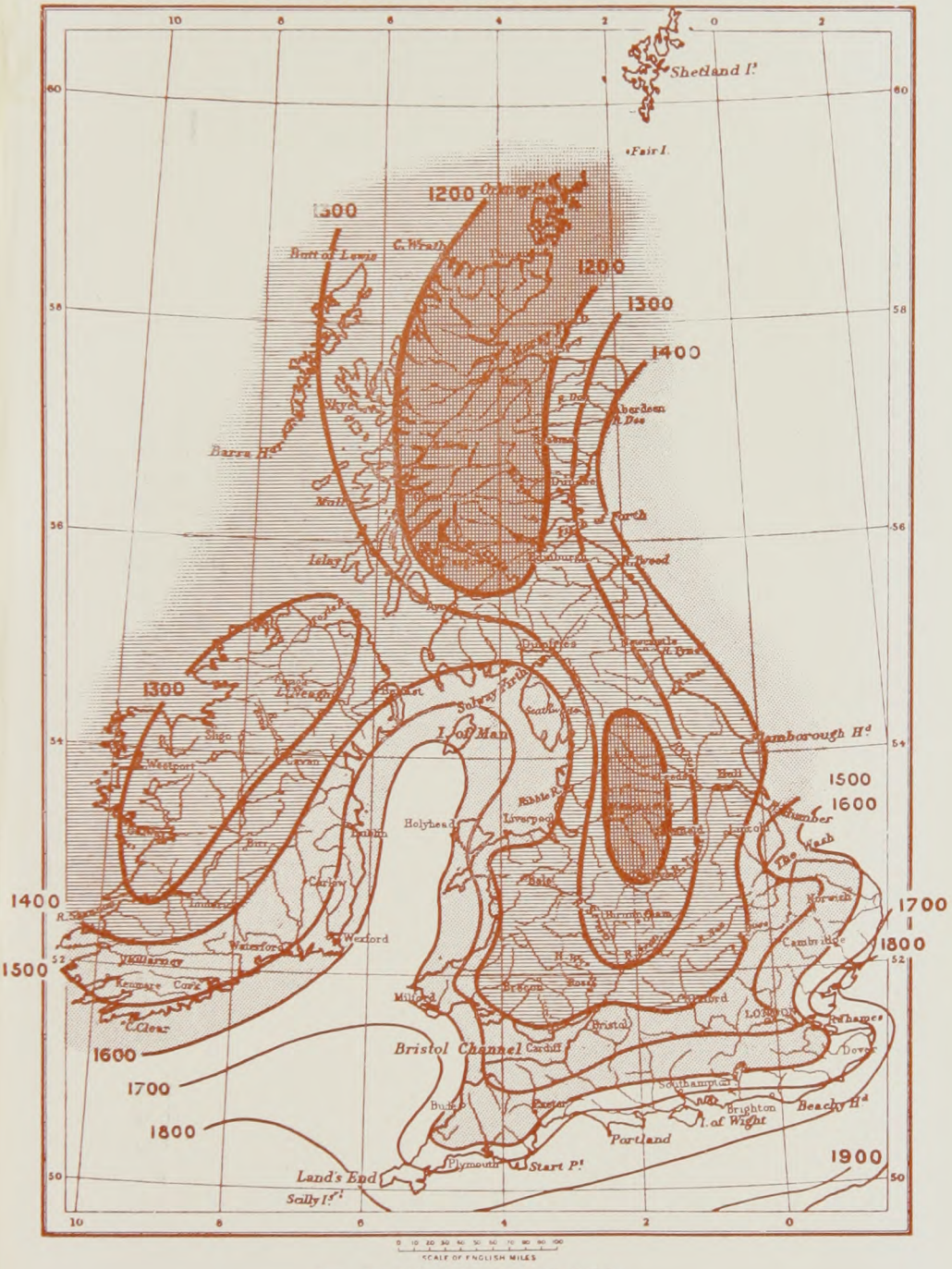
off a large percentage of the sun's heat rays, and of course the immediate neighbourhoods of these centres suffer most of all; the map is, however, too small to allow of their being specially indicated. To some extent the hilly, and therefore rainy, districts of the west show smaller sunshine totals than places on the eastern littoral in the same latitude; but this is indicated more in certain months than in others, and a heavy rainfall and large total of sunshine frequently occur at the same station, the explanation being that a large rainfall is not necessarily a prolonged one. Unfortunately, as has already been said, some portions of the Kingdom are still very inadequately represented by sunshine recorders, and for these regions the lines on the map are somewhat hypothetical; a great part of Ireland, Central Wales, and the Highlands of Scotland are such regions, but it is perhaps not too much to hope that in the next few years this defect will largely be removed.

Of the several months, May and June are the most sunny, and December is almost everywhere the least so. In winter, the largest totals of sunshine are obtained in the rainy south-west; and at that season of the year the effect of the ejecta from the towns is felt in their neighbourhoods more severely than at any other period, the lower altitude of the sun making it more difficult for its rays to penetrate the dusty screen they have to traverse before reaching the Earth. There are, however, many points of view from which the data given in the map might be discussed. The relation between the average duration of sunshine and the mean temperature, the range of temperature, the temperature of the soil, the cloudiness of the sky, and the prevalence of rain, are some of those which might be dealt with did space permit.

Total number of hours during which the sun is above the horizon in each month, and for the whole year; for each 2° of Latitude from 50° to 60°.

Months.	LATITUDE.					
	50°	52°	54°	56°	58°	60°
January	265	256	246	235	223	208
February	280	275	271	266	259	253
March	365	365	364	363	363	362
April	410	413	417	422	427	432
May	474	483	491	501	513	526
June	487	497	509	523	539	558
July	491	501	511	524	538	555
August	447	453	459	466	473	482
September	379	380	382	383	385	387
October	334	331	327	323	319	315
November	272	265	258	249	239	227
December	251	241	229	216	202	184
YEAR	4455	4460	4464	4471	4480	4489

AVERAGE ANNUAL DURATION OF SUNSHINE



By RICHARD H. CURTIS.

The foregoing Table gives the total possible duration of sunshine for every month, and for each two degrees of latitude from 50° to 60°. Some of our readers may desire to express their monthly results as percentages of these possible amounts, which may readily be done by dividing the recorded monthly total by the number in the Table corresponding to the month and the latitude of the station.

THE BRITISH ASSOCIATION AT LEICESTER.

(SECOND ARTICLE).

THE following Abstracts and Reports are all the available material provided by Section A for the assistance of the Press in following the meteorological discussions which took place at the meeting.

Examples of the Modern Methods of Treating Observations. By W. Palin Elderton.

This communication dealt with the application of recognised statistical processes to meteorological statistics. The terms *mean*, *median*, and *mode* were defined, and the methods of calculating their values given, with examples from rainfall statistics. The "*method of moments*" was described, and as an application a parabolic curve was fitted to statistics of rainfall in the east of England. The *standard deviation* was then explained, and it was pointed out that this function measures the way the observations are scattered about their mean. The importance of calculating a "standard deviation" or a "probable error" corresponding with means was then insisted on; the mere statement of a mean is statistically insufficient and of no use for comparative purposes until we know what deviations from the calculated value may arise.

The remainder of the communication dealt with correlation. The coefficient of correlation was first explained, and it was shown how it can be calculated. The rainfall in the east of England was compared with that in the north of Scotland and in the Channel Islands: in the former case the coefficient of correlation is very small, and about equal to its probable error, so that we cannot conclude that there is any correlation; but in the latter case the coefficient is found to be ·374+·065, and indicates that there is a distinct connection between the rainfall in the east of England and that in the Channel Islands. Another example taken was rainfall and typhoid cases in Surrey districts, the water supply of which is obtained from river sources. The coefficient of correlation is ·116, with a probable error of ·073, so that it is impossible to assert definitely that there is any relation between rainfall and typhoid—at any rate on the evidence afforded by these statistics. Reference was made to a paper on

barometric heights by Professor Karl Pearson, F.R.S., and Dr. Alice Lee, and to the use of the coefficient of correlation by Dr. Gilbert T. Walker, F.R.S., in his interesting memoranda on the meteorology of India.

The author concluded with an appeal for the more scientific treatment of statistics by modern methods.

An Analytical Study of the Meteorological Observations made at the Glossop Moor Kite Station during the Session 1906-1907. By Margaret White, T. V. Pring and J. E. Petavel, F.R.S.

In Part I. the change of temperature with height is considered. The rate of fall, or temperature gradient, is measured in degrees centigrade per hundred metres. The average gradient for the present year is given for the various English stations at each successive 500 metres above sea level. The values for Glossop Moor are 1·24° C., 0·91° C., 0·61° C. and 0·33° C., per 100 metres at heights of 400, 750, 1250, and 1750 metres. These results are compared with the observations made in previous years in America at Blue Hill, and in Europe at Berlin, Oxshott, and Crinan.

The temperature gradient varies: (1) with the wind direction, and is at all levels a maximum for a N.W. wind; (2) with the amount of clouds, and is at all levels a maximum on clear and fine days; (3) with the wind velocity, and is a maximum for low velocities.

Tables and diagrams illustrating these facts are included in the paper.

Part II. deals with the question of wind velocity. The average velocity is calculated for all stations at ground level, 500, 1000, and 1500 metres. For Glossop Moor the averages are 13, 26, 30, and 33 miles per hour respectively at these heights. Except at the ground level where it is influenced by local conditions, the average wind velocity at each height differs but little from station to station.

Comparing the velocities at various heights it is found that above a height of 500 metres the average increase is 0·6 mile per hour per 100 metres difference of level.

Curves showing the connection between the wind velocity and barometric gradient are given.

The effects of the absolute barometric height, of the season of the year and the wind direction, are also considered.

With regard to the alteration of wind direction with height, the results usually indicate a slight rotation in a clockwise direction, *i.e.*, a west wind tends to become more northerly, &c.

A number of subsidiary questions, such as the conditions prevailing during temperature inversions, the occurrence of vertical air currents, and a general discussion of the hygrometric observations, are included in the paper.

Investigation of the Upper Atmosphere by Means of Kites in co-operation with a Committee of the Royal Meteorological Society.—Sixth Report of the Committee, consisting of Dr. W. N. Shaw (Chairman), Mr. W. H. Dines (Secretary), Mr. D. Archibald, Mr. C. Vernon Boys, Dr. R. T. Glazebrook, Dr. H. R. Mill, Professor A. Schuster, and Dr. W. Watson. (Drawn up by the Secretary).

Meetings of the Joint Committee were held on November 13th, 1906; also on January 24th, May 9th, May 23rd, and July 5th, 1907. Observations have been made by Mr. J. E. Petavel, F.R.S., at Glossop Moor, whose report on the subject is appended.

The Committee have had under consideration a circular sent out by Professor Hesgesell, the President of the International Aeronautical Commission. In it he asks for the co-operation of England in a special series of kite and balloon ascents, and the Committee have arranged for some ascents, in addition to those undertaken by the Meteorological Office, on the specified days.

At the meeting of the Joint Committee held on May 9th it was suggested that the British Association Committee should ask for re-appointment and for a grant of £25.

Glossop Moor Kite Station (Peak District). Report for the Session 1906-1907. By J. E. Petavel, F.R.S.

This kite station was established in the spring of 1906 by Mr. G. C. Simpson.

The necessary winding gear was purchased by aid of a grant from the Royal Meteorological Society; the other initial and current expenses have been defrayed by the Manchester University.

During the present session some sixty successful ascents have been made, Messrs. T. V. Pring and W. A. Harwood having kindly acted as voluntary assistants.

Miss Margaret White has undertaken an analytical study of the records obtained, and proposes to give a short account of the results of the work at the coming meeting of the British Association.

Recently the Government Grant Committee of the Royal Society have awarded the funds required to complete and perfect the apparatus installed at this station.

Meteorological Observations on Ben Nevis.—Report of the Committee, consisting of Lord McLaren (Chairman), Professor Crum Brown (Secretary), Sir John Murray, Professor F. W. Dyson, and Mr. R. T. Omond.

As mentioned in the report for 1905, the meteorological observations on Ben Nevis have now ceased, but the Committee have co-operated with the Scottish Meteorological Society in the discussion of the observations made on Ben Nevis and at Fort William during the twenty-one years that the observations were carried on. This discussion was conducted under the direction of the late Dr. Alexander

Buchan, but owing to his death on May 13th last no report can be furnished this year. It is proposed that the discussion be continued by Mr. Omond and others during the ensuing year.

The observations made at the high and low level observatories from the opening of the Ben Nevis Observatory in 1883 till the end of 1897 have been published, and those for two additional years—1898 and 1899—are in type. The observations to the end of 1887 were published by the Royal Society of Edinburgh. The cost of printing those of the succeeding twelve years—1888 to 1899 inclusive—has been defrayed by a grant of £500 from the Royal Society of London, and anothar grant of £500 from the Royal Society of Edinburgh. There still remain nearly five years' observations in manuscript, namely, from January, 1900, to September, 1904. The Committee consider it exceedingly desirable that these last observations should also be published, so that the whole record from the Ben Nevis Observatory be made available to meteorologists.

The estimated cost of printing these observations is £400, and towards this the Royal Society of Edinburgh has offered a grant of £200, spread over four years, on condition that the remainder of the money be obtained from other sources. The Royal Society of London has voted £50 for this object, so that there is still a sum of £150 required to make up the £400 necessary for the complete publication of the Ben Nevis records.

The Committee hope that the British Association will see its way to make up this deficiency by a grant from its funds, so as to enable the printing to go forward. The Committee beg to point out that it is some years since a grant was asked for the Ben Nevis work, and that at present there are no funds available for the purpose except what have been promised by the two scientific societies.

INTERNATIONAL INVESTIGATION OF THE UPPER ATMOSPHERE.

By William Marriott, F.R.Met.Soc.

During the last few years systematic attempts have been made to acquire information as to the meteorological conditions prevailing in the upper regions of the atmosphere. The method generally adopted has been to send up kites carrying meteorographs, which give records of the pressure, temperature and humidity. The direction in which the kite is flying shows the direction of the wind at that altitude, and the "pull" on the wire is an indication of the force of the wind.

In 1901, the Royal Meteorological Society and the British Association appointed a joint Committee to carry out such investigations in this country. The Committee were fortunate in securing the valuable co-operation and help of Mr. W. H. Dines, F.R.S., who kindly carried out the work, and also made the kites and winding

apparatus, and designed the light and simple meteorographs now in use. In the summers of 1902-3-4, kite ascents were made from specially chartered steamers off the west coast of Scotland. Mr. Dines continued the observations for the joint Committee at Oxshott until the Meteorological Office made the investigation of the upper atmosphere a branch of their work, and invited Mr. Dines to be superintendent of the work.

Mr. C. J. P. Cave has established a kite station at Ditcham Park, near Petersfield, where he has carried out numerous ascents. Mr. Salmon also has a kite station at Brighton.

Under the auspices of the joint Committee a kite station has been established, under the supervision of Prof. A. Schuster, F.R.S., at Glossop Moor, and the ascents have been carried out first by Dr. G. C. Simpson, and subsequently by Mr. J. E. Petavel, F.R.S. A summary of all the kite observations appears regularly in the "Weekly Weather Report" of the Meteorological Office.

The International Commission of Scientific Aeronautics, at their meeting last year at Milan, resolved to carry on during the years 1907 and 1908 a much more extended investigation of the upper atmosphere over the Northern Hemisphere than had hitherto been attempted. For this purpose, it was decided to supplement the kite observations by using pilot balloons (*ballons sondes*) to carry self-recording instruments, and also smaller balloons, the heights and drift of which were to be determined by two theodolites placed at the ends of a fixed base. The special ascents in 1907 were to be made on July 22nd to 27th, September 4th to 6th, and November 6th to 8th.

This scheme was heartily taken up by observers in most of the countries in the Northern Hemisphere. The Prince of Monaco proposed to make experiments in the far north; and the German Admiralty intended to send out a vessel fitted up for balloon ascents between Iceland and Norway. Another German expedition was also to be sent to the latitude of the Hebrides; while the French Admiralty intended sending out a vessel to the neighbourhood of the Azores. M. Teisserenc de Bort and Prof. A. L. Rotch also intended arranging ascents from their yacht, "Otaria," in the region of the trade winds and the doldrums.

With regard to the British Isles, the joint Kite Committee arranged for three stations, viz., at Sellack, in Herefordshire, under the charge of Capt. C. H. Ley; at Manchester University, under the charge of Mr. J. E. Petavel, F.R.S.; and at Trinity College, Dublin, under the charge of Prof. W. E. Thrift. The Meteorological Office also arranged for three stations, viz., Pyrton Hill, Oxon, and at Crinan, in Scotland, both under the supervision of Mr. W. H. Dines, F.R.S.; and at Ditcham Park, under the charge of Mr. C. J. P. Cave.

One or more balloons were sent up each day between July 22nd and 27th, from each of these stations. Twenty-four meteorographs

were sent up, some of which have been recovered. Two of those sent up from Manchester, reached a height of about 10 miles, and the lowest temperature recorded was about —58° F.

Unfortunately, low clouds prevailed during most of the period over which the experiments were carried out, and so comparatively few trigonometrical measurements could be made of the heights and drift of the balloons.

As the cutting of the corn is now in full swing, and as shooting is soon to commence, may I ask those of your readers who are engaged in the same to keep a sharp look out for the little cylinders containing meteorographs, and to carefully handle them (so as not to vitiate the records), and to return them to the address given on the label, or to forward them direct to me at 70, Victoria Street, Westminster.

I may mention that the next special series of ascents will be from the 4th to 6th of September.

It is hoped that when all the observations have been collated and discussed, much valuable information will have been obtained regarding the meteorological conditions prevailing in the upper regions of the atmosphere over the Northern Hemisphere.

THE SUN AS A TWINKLING STAR.

By Miss C. O. Stevens.

With the employment of a suitable screen of some woven fabric (such as canvas or linen) to shield the eye from a too-blinding glare of sunlight, direct naked-eye observations of the sun may be made which show that the sun, shining in a cloudless sky, presents the normal appearance of a twinkling star, only on a greatly enlarged scale. Attentive observation of the phenomena of "twinkling," associated by this means with the sun, confirms the conclusion that, in their origin, they are to be traced to the same causes exactly as provoke the normal scintillations of the stars.

But it is to be noted that certain characteristics of these phenomena are most readily and reliably to be observed only in association with observation of the sun, owing, doubtless, to the comparatively great diameter of the area of illumination that offers for the purposes of the observation.

Thus, the sun offers special advantages for study of the various characteristics, and the possible sources of the interferences, that affect the direct passage of light through the Earth's atmosphere.

In the case of the sun, the phenomena of "twinkling" resolve themselves into the sweeping across the line of sight of bands or waves of alternately greater or less illumination, in parallel formation, lying at right angles to the direction of their propagation, and observation has shown, that while their direction of movement is variable, it bears a constant relation to the directions of drift of the atmosphere prevailing at the time and place of observation, whether these contemporaneous conditions be determined by ordinary methods

(wind-vanes, kites, etc.), or whether they may *only* be determined by the more searching method of telescopic observation of the features of atmospheric distortion of the sun's limb.

In offering a solution of the phenomena of stellar scintillations, Montigny surmises the occurrence in the upper regions of the atmosphere of the passage, across the line of sight between the star and the observer, of transparent prisms of air. The physical reality of such prisms of clear air is, presumably, demonstrated in the photographic records of the sun, taken at the Royal Observatory, Greenwich, and elsewhere, which appear to testify to a waved, or billowed, configuration of the atmospheric strata, and even to testify to the variability of their formation in detail, as well as of their direction and rate of movement. In other words, the features of atmospheric distortion of the sun's limb vary concordantly with variations in the direction and force of drift of the overlying strata of the atmosphere at the place of observation.

Further confirmation of the same is supplied by recorded observations of "shadow bands" at times of total solar eclipse; and also in the familiar features of "rippled" cloud structures. It is again, and perhaps pre eminently, confirmed by the fact that (in spite of their visibility to the naked eye being theoretically denied) stellar scintillations are easily to be traced in the zenith, though at all times less easily here than at lower altitudes.

The direction of propagation of the "twinkling" waves is a delicate element to determine precisely by naked-eye observation of the sun, and requires, on the part of the observer, an absolutely fixed point of view, such as is only to be secured by the use of some kind of head-rest.

Correspondence.

To the Editor of Symons's Meteorological Magazine.

GOLDEN MARCH DUST.

I MAY observe, with regard to recent correspondence in your pages, that March dust is "worth its weight in gold" in Western Austria also by common consent, and its golden value is apparent from the agricultural point of view. The ground for this belief is the warming of the soil, which takes place very rapidly on sunny days in March, and at that time of year warm soil is of greater importance to crops than high air temperature. If the soil remains cold the warmth of the air does little good; in fact, it often does harm by increasing evaporation, whilst the activity of the roots in the cold soil is insufficient to bring up moisture from below, and the plants get dried up. On the other hand, a wet April, and especially a wet May, is greatly valued by our farmers.

J. HANN.

Vienna, 19th August, 1907.

THUNDERSTORM OF 21st JULY, 1907, IN THE CARTMEL DISTRICT.

THE severe thunderstorm on Sunday, the 21st, was really a succession of thundershowers, and, so far as this district was concerned, its full force seemed to be expended at Grange, Lindale-in-Cartmel, and up the Winster valley on the border of Lancashire and Westmorland.

Sheep were killed on Hampsfell Farm, above Grange, and on land near Lindale. At Farnside, Crosthwaite, on the Westmorland side of the Winster, a ball of fire fell in the lot, 100 yards above the house, splitting the rock open for yards, which, with the loose stones about it, appeared to have been blasted. A valuable horse was found injured at the foot of the rock, but whether struck by lightning or frightened by the shock is not known; we understand it is improving nicely, although, no doubt, its value must in any case be somewhat reduced. None of the family at the house were injured, though they felt a slight shock.

At Carke we heard the thunder and saw flashes of lightning most of the afternoon and during the night. We had ·22 in. of rain in the afternoon, and ·42 in. came with thunder-showers during the night.

At Yew-barrow House, Grange, there were five separate thunderstorms between 3 p.m. on Sunday and 1 a.m. on Monday morning.

Rainfall in 24 hours at		Flookburgh Lodge.....	·61 ins.
,,	,,	The Mount, Carke.....	·64 ,,
,,	,,	Holker Gardens.....	·66 ,,
,,	,,	Aynsome, Cartmel.....	1·17 ,,
,,	,,	Yew-barrow, Grange.....	2·23 ,,

During the same time we find that at Broughton-in-Furness there fell ·65 in., and at Sawrey, near Hawkshead, ·62 in.

W. R. NASH.

The Mount, Carke-in-Cartmel.

AUGUST SHOOTING STARS.

THOUGH these bodies are of cosmical origin and are now usually understood to belong to the purely astronomical branch of science, the fact that they are rendered luminous in our atmosphere, and consumed there, still justifies them in holding a place amongst meteorological phenomena. For this reason I send you a few brief notes of the return of the August shower of Perseids this year. It was already distinctly visible on August 4th and 6th, for a few bright meteors were seen during those nights which were directed from the usual point in Perseus. On August 10th the hourly number of shooting stars visible during the night increased from 25 to 45. On

August 11th the number varied from 15 to 36. On August 12th there was apparently a slight increase, the hourly numbers ranging from 23 to 50.

The place of the radiant point on August 10th was at 44° + 56°, and on August 12th at 47° + 57°. On the whole the shooting stars appeared to be rather smaller, and somewhat less abundant, than during a pretty conspicuous return of the shower.

Of meteors not belonging to the Perseid stream, a few very interesting examples were recorded. On August 10th, at 10.30 p.m., a bright meteor fell near Alpha Andromedæ from the direction of Cygnus, and on the same night at 11.6 p.m. a conspicuous slow-moving object sailed through the northern part of Cassiopeia, from the direction of Aquila..

Miss Irene Warner, of Horfield Common, Bristol, has kindly sent me notes of her observations on August 11th and 12th. Watching for two hours, between 9.25 p.m. and 11.40 p.m. on August 11th, she counted 56 meteors, of which 9 only belonged to showers other than the Perseids. On August 12th, in 2½ hours between 9.15 p.m. and 0.20 a m., she counted 49 meteors, and they were nearly all Perseids. A bright meteor was seen on August 12th at 10.55 p.m. It passed slowly along from Delta to Alpha Cygni, and left a bright yellow train. At about 11.12 p.m. a very large meteor burst out suddenly close to the radiant point of the Perseids, and moved to south-east, almost parallel with the stars Gamma, Alpha and Delta in Perseus. The meteor left a bright streak. It appears to have been also observed by Mr. Kenyon at Stockport, and Mr. Corder at Bridgwater, and its real height was from 79 to 44 miles. The middle of its course was vertically over Rugby. Mr. Kenyon describes the meteor as flashing out with a brightness equal to the moon.

Though the recent display failed to exhibit exceptional richness, it has furnished us with some new and interesting data, which may contribute to advance our knowledge of one of the most important meteoric streams with which we are acquainted.

W. F. DENNING.

Bristol, August 14th, 1907.

SUGGESTED TERMINOLOGY.

READING over once more the prefatory Report of "British Rainfall, 1905," it seems just worth while to offer for consideration respecting "Terminological exactitude," for *a succession of more than fourteen days on each of which rain fell*, this compound word, *rain-run*, or (as one word) *rainrun*.

J. FIRTH.

The Cemetery, Huddersfield, July 11th, 1907.

BRITISH RAINFALL, 1906.

THE annual volume, which brings to a focus the work of the great army of rainfall observers in Great Britain and Ireland, has just been published under the title of "British Rainfall, 1906. On the Distribution of Rain in Space and Time over the British Isles during the year 1906, as recorded by more than 4,000 Observers in Great Britain and Ireland, and discussed, with Articles upon various branches of Rainfall work, by Hugh Robert Mill. The Forty-sixth annual volume, with maps and illustrations. London: Edward Stanford, 12, 13 and 14, Long Acre, W.C. 1907."

The frontispiece is a coloured map, showing the variation of the rainfall of the British Isles in 1906 from the average of thirty years. By the use of deepening tints of blue for rainfall progressively more and more above the average, and deepening shades of red for rainfall more and more below the average, the wet and dry areas are made to stand out very clearly.

As usual the volume is divided into two parts. Part I. contains a report of the work of the Rainfall Organization and two original papers. One of these, by the Editor, gives a discussion of the great snowstorm of Christmas, 1906, based on special reports by nearly 2,000 observers in all parts of the country. Two maps illustrate the depth of snow and the hour at which the snowfall commenced. The latter is of particular interest, as it shows the lines along which snow began to fall simultaneously, the earliest being before noon on Christmas Day in the north-east of Ireland, the latest after 2 a.m. on Boxing Day in the extreme south-east of England. The second article is a *resumé* by Mr. Bonacina, with a bibliography, of the investigations which have been made into the influence of wind on the catch of rain in rain gauges. The remainder of part I. deals with observations on evaporation and on the duration of rainfall, specimen registers of daily rainfall, and a complete list of the changes in observing stations as compared with the previous year. The last article is devoted to the Obituary, and this is unhappily a long one, as the number of observers recently deceased is greater than in any previous year.

Part II. is devoted largely to the remarks of individual Observers on the weather of the days, months, and of the whole year in 1906, but it also contains detailed discussions of heavy falls of rain, with maps showing the distribution of rainfall on the wettest days of the year. These maps bring out the relation of the areas of heaviest precipitation to the track of the atmospheric depressions with which the rain was associated.

The discussion of the distribution of rainfall in time is continued in accordance with the plan first adopted in 1903, and the various features are illustrated by maps. Then follow the discussion of the rainfall of the months, individually and in groups, and of the year

as a whole, maps being freely used to show the difference between 1906 and an average year.

Last of all comes the General Table of total annual rainfall at the 4,267 points where rain gauges are now established, and it gives the names of all the Observers or other authorities for the record.

METEOROLOGICAL NEWS AND NOTES.

THE FIVE HUNDREDTH NUMBER of *Symons's Meteorological Magazine* is now before our readers, a fact of no little interest when the smallness of the public to which such a journal appeals is taken into account. When Mr. Symons produced No. 1 in February, 1866, he had already issued a "monthly rain circular," as a supplement to "British Rainfall" for several years, so that a greater antiquity might plausibly be claimed for the Magazine than the numeral implies. The Magazine, though small, has grown, and is not, we trust, incapable of further growth without departing from the original lines on which it was planned. As an independent organ of opinion in meteorological matters, it has, we believe, been of use in the past, and we hope that this usefulness will continue. We heartily thank the many friends who have helped us hitherto, and we look forward with confidence to a wider circle of readers.

DR. G. HELLMANN has, we are happy to learn, been appointed Professor of Meteorology in the University of Berlin and Director of the Prussian Meteorological Service, in succession to the late Professor von Bezold.

TEMPERATURE FOR AUGUST, 1907.

STATION.	COUNTY.	Lat. N.	Long. W. [*E.]	Height above Sea.	TEMPERATURE. Max.		TEMPERATURE. Min.		No. of Nights at or below 32°	
									Shade.	Grass.
		° ′	° ′	ft.	°	Date.	°	Date.		
Camden Square	*London*	51 32	0 8	111	78·3	4	44·1	2	0	0
Tenterden	*Kent*	51 4	*0 41	190	77·0	4, 29	44·0	20, 21	0	0
West Dean	*Hampshire*	51 3	1 38	137	73·0	29	37·0	25	0	5
Hartley Wintney	,,	51 18	0 53	222	74·0	5, 29	38·0	26	0	0
Hitchin	*Hertfordshire*	51 57	0 17	238	72·0	3†	41·0	27	0	...
Winslow (Addington)	*Buckinghamshr.*	51 58	0 53	309	73·0	4	39·0	28	0	0
Bury St. Edmunds (Westley)	*Suffolk*	52 15	*0 40	226	78·0	29	44·0	1, 2	0	...
Brundall	*Norfolk*	52 37	*1 26	66	77·4	4	43·0	14	0	0
Winterbourne Steepleton	*Dorset*	50 42	2 31	316	70·8	28	38·8	25	0	...
Torquay (Cary Green)	*Devon*	50 28	3 32	12	70·6	29	47·7	21	0	0
Polapit Tamar [Launceston]	,,	50 40	4 22	315	70·0	29	40·2	28	0	0
Bath	*Somerset*	51 23	2 21	67	72·0	13	44·0	24	0	...
Stroud (Upfield)	*Gloucestershire*	51 44	2 13	226	74·0	29	48·0	1§	0	...
Church Stretton (Wolstaston)	*Shropshire*	52 35	2 48	800	70·0	13	32·0	20	1	...
Coventry Kingswood	*Warwickshire*	52 24	1 30	340	72·0	9	42·0	26	0	...
Boston	*Lincolnshire*	52 58	0 1	25	75·0	4	42·0	28	0	...
Worksop (Hodsock Priory)	*Nottinghamshire*	53 22	1 5	56	72·7	3	37·6	28	0	1
Derby (Midland Railway)	*Derbyshire*	52 55	1 28	156	74·0	3, 4	37·0	27	0	...
Bolton (Queen's Park)	*Lancashire*	53 35	2 28	390	67·7	4	42·0	30	0	0
Wetherby (Ribston Hall)	*Yorkshire, W.R.*	53 59	1 24	130	...	...	...	...	...	...
Arncliffe Vicarage	,, ,,	54 8	2 6	732	...	...	...	...	...	...
Hull (Pearson Park)	,, *E.R.*	53 45	0 20	6	74·0	4, 5, 12	42·0	24, 28	0	0
Newcastle (Town Moor)	*Northumberland*	54 59	1 38	201	...	...	...	...	...	...
Borrowdale (Seathwaite)	*Cumberland*	54 30	3 10	423	63·6	4	38·4	30	0	...
Cardiff (Ely)	*Glamorgan*	51 29	3 13	53	...	...	...	...	...	...
Haverfordwest (High Street)	*Pembroke*	51 48	4 58	95	...	..	...	...	...	0
Aberystwyth (Gogerddan)	*Cardigan*	52 26	4 1	83	71·0	5‡	33·0	23	0	...
Llandudno	*Carnarvon*	53 20	3 50	72	69·8	13	45·7	30	0	...
Cargen [Dumfries]	*Kirkcudbright*	55 2	3 37	80	66·0	12	34·0	30	0	...
Lilliesleaf (Riddell House)	*Roxburgh*	55 31	2 46	550	...	..	...	...	...	...
Edinburgh (Royal Observy.)	*Midlothian*	55 55	3 11	442	66·1	4	42·6	2	0	0
Girvan (Pinmore)	*Ayr*	55 10	4 49	207	67·0	13	35·0	30	0	...
Glasgow (Queen's Park)	*Renfrew*	55 53	4 18	144	67·0	20	42·0	1, 25	0	3
Tighnabruaich	*Argyll*	55 55	5 14	50	62·0	12	38·0	31	0	0
Mull (Quinish)	,,	56 36	6 13	35	65·0	15	...	...	...	...
Dundee (Eastern Necropolis)	*Forfar*	56 28	2 57	199	69·2	9	38·0	30	0	...
Braemar	*Aberdeen*	57 0	3 24	1114	...	...	...	...	...	...
Aberdeen (Cranford)	,,	57 8	2 7	120	68·0	6, 7	35·0	29, 31	0	...
Cawdor (Budgate)	*Nairn*	57 31	3 57	250	...	...	...	...	...	...
Invergarry	*E. Inverness*	57 4	4 47	13c?	...	...	...	...	...	...
Loch Torridon (Bendamph)	*W. Ross*	57 32	5 32	20	...	...	...	...	...	...
Dunrobin Castle	*Sutherland*	57 59	3 56	14	61·0	22	42·0	31	0	...
Castletown	*Caithness*	58 35	3 23	100	64·0	5, 18	36·0	13, 28	0	0
Killarney (District Asylum)	*Kerry*	52 4	9 31	178	70·0	14	46·0	1	0	...
Waterford (Brook Lodge)	*Waterford*	52 15	7 7	104	69·0	12	40·0	30	0	...
Broadford (Hurdlestown)	*Clare*	52 48	8 38	167	68·0	1	40·0	29	0	...
Abbey Leix (Blandsfort)	*Queen's County*	52 56	7 17	532	71·0	13	...	...	...	...
Dublin (Fitz William Square)	*Dublin*	53 21	6 14	54	73·1	13	44·1	30	0	0
Ballinasloe	*Galway*	53 20	8 15	160	69·5	28	30·0	30	1	...
Clifden (Kylemore House)	,,	53 32	9 52	105	...	...	...	...	...	...
Crossmolina (Enniscoe)	*Mayo*	54 4	9 18	74	...	..	...	...	...	...
Seaforde	*Down*	54 19	5 50	180	71·0	12, 13	40·0	29	0	0
Londonderry (Creggan Res.)	*Londonderry*	54 59	7 19	320	...	...	...	...	...	...
Omagh (Edenfel)	*Tyrone*	54 36	7 18	280	...	...	...	...	...	...

† and 4, 14, 29. ‡ and 18, 29. § and 23, 24.

RAINFALL FOR AUGUST, 1907.

RAINFALL OF MONTH.							RAINFALL FROM JAN. 1.					
Aver. 1870-99.	1907.	Diff. from Av.	% of Av.	Max. in 24 hours.		No. of Days	Aver. 1870-99.	1907.	Diff. from Aver.	% of Av.	Mean Annual 1870-1899.	STATION.
				in.	Date.							
in.	in.	in.					in.	in.	in.		in.	
2·33	1·94	— ·39	83	·50	14	13	15·45	13·94	— 1·51	90	25·16	Camden Square
2·37	1·93	— ·44	81	·79	17	12	16·18	13·29	— 2·89	82	28·36	Tenterden
2·60	1·79	— ·81	69	·88	17	15	17·83	13·99	— 3·84	78	29·93	West Dean
2·09	2·64	+ ·55	126	1·10	17	13	16·06	15·59	— ·47	97	27·10	Hartley Wintney
2·26	1·77	— ·49	78	·49	2	15	15·07	14·59	— ·48	97	24·66	Hitchin
2·53	1·78	— ·75	70	·65	2	14	16·58	14·84	— 1·74	90	26·75	Addington
2·40	2·27	— ·13	95	·60	2	16	15·63	16·24	+ ·61	104	25·39	Westley
2·19	1·13	—1·06	52	·36	2	14	15·01	16·00	+ ·99	107	25·40	Brundall
3·18	1·72	—1·46	54	·40	17	13	22·32	17·90	— 4·42	80	39·00	Winterbourne Stpltn
2·91	·72	—2·19	25	·17	17	13	20·69	15·90	— 4·79	77	35·00	Torquay
3·19	1·82	—1·37	57	·44	17	19	21·57	19·09	— 2·48	89	38·85	Polapit Tamar
2·96	2·22	— ·74	75	·67	2	19	18·82	19·14	+ ·32	102	30·75	Bath
2·83	2·12	— ·71	75	·57	17	19	18·56	17·80	— ·76	96	29·85	Stroud
3·24	3·32	+ ·08	102	·85	14	16	20·21	21·26	+ 1·05	105	33·04	Wolstaston
2·77	2·65	— ·12	96	·67	2	15	18·08	17·75	— ·33	98	29·21	Coventry
2·25	1·96	— ·29	87	·55	2	13	14·45	13·16	— 1·29	91	23·30	Boston
2·31	1·72	— ·59	75	·77	14	14	15·63	13·52	— 2·11	86	24·70	Hodsock Priory
2·42	3·38	+ ·96	140	1·29	14	15	16·53	19·16	+ 2·63	116	26·18	Derby
4·36	5·37	+1·01	123	1·42	14	21	25·23	31·88	+ 6·65	126	42·43	Bolton
2·59	1·72	— ·87	66	·60	14	15	16·83	16·55	— ·28	98	26·96	Ribston Hall
5·43	5·37	— ·06	99	·73	7	24	36·87	41·58	+ 4·71	113	60·96	Arncliffe Vic.
2·81	1·61	—1·20	57	·79	14	12	16·55	15·32	— 1·23	93	27·02	Hull
3·14	2·32	— ·82	74	·61	15	18	17·40	16·00	— 1·40	92	27·99	Newcastle
11·23	13·65	+2·42	122	3·38	11	26	77·96	81·11	+ 3·15	104	132·68	Seathwaite
4·52	3·89	— ·63	86	1·08	2	22	25·23	23·35	— 1·88	93	42·81	Cardiff
4·04	4·39	+ ·35	109	1·12	2	14	27·41	25·48	— 1·93	93	47·88	Haverfordwest
4·60	4·88	+ ·28	106	1·25	15	16	26·46	30·37	+ 3·91	115	45·41	Gogerddan
2·86	3·37	+ ·51	118	·67	14	17	17·65	16·21	— 1·44	92	30·98	Llandudno
4·10	4·63	+ ·53	113	·90	14	20	26·15	30·63	+ 4·48	117	43·43	Cargen
3·42	...	..	...	...	...	...	20·56	...	...	...	33·04	Riddell House
...	3·52	...	...	·91	14	21	...	19·68	...	...	...	Edinburgh
4·34	5·88	+1·54	135	·64	18	31	28·46	...	...	...	48·87	Girvan
3·79	4 65	+ ·86	123	·92	11	24	22·09	26·43	+ 4·34	120	35·80	Glasgow
5·13	6·48	+1·35	126	·86	28	25	34·11	40·26	+ 6·15	118	57·90	Tighnabruaich
4·84	7·99	+3·15	165	1·27	28	29	33·06	35·75	+ 2·69	108	57·53	Quinish
3·08	3·80	+ ·72	123	·45	9,	23	18·20	20·10	+ 1·90	110	28·95	Dundee
3.83	3·35	— ·48	87	...	...	...	21·66	20·80	— ·86	96	36·07	Braemar
3·22	2·55	— ·67	79	·37	2	22	19·93	19·39	— ·54	97	33·01	Aberdeen
3·07	3·27	+ ·20	107	·46	10	20	18·33	21·39	+ 3·06	117	29·37	Cawdor
4·19	6·83	+2·64	163	·70	29	26	32·69	40·93	+ 8·24	125	56·00	Invergarry
6·91	9·59	+2·68	139	·71	28	31	49·41	64·96	+15·55	132	86·50	Bendamph
2·65	3·70	+1·05	140	·81	18	18	18·92	23·81	+ 4·89	126	31·60	Dunrobin Castle
...	4·38	...	...	·84	18	31	...	22·43	...	...	...	Castletown
4·92	4·40	— ·52	89	·83	4	24	34·90	25·70	— 9·20	74	58·11	Killarney
3·71	3·01	— ·70	81	·95	2	12	24·00	21·63	— 2·37	90	39·30	Waterford
3·79	3·50	— ·29	92	·40	11	26	20·85	22·11	+ 1·26	106	33·47	Hurdlestown
3·94	3·11	— ·83	79	·38	28	23	22·19	22 97	+ ·78	104	35·19	Abbey Leix
3·02	2·23	— ·79	74	·50	29	19	17·53	16·58	— ·95	95	27·75	Dublin
3.96	3·03	— ·93	77	·45	7	23	23·19	23·68	+ ·49	102	37·04	Ballinasloe
7·90	.	...	...	...	...	...	48·34	...	...	...	80·23	Kylemore House
4·57	3·77	— ·80	82	·49	3	29	29·90	32·33	+ 2·43	108	50·50	Enniscoe
3·52	3·36	— ·16	95	·47	2	22	23·84	26·21	+ 2·37	110	38·61	Seaforde
3·94	5·07	+1·13	129	·62	7	30	24·48	34·81	+10·33	142	41·20	Londonderry
4·03	...	...	...	.	...	...	23·28	...	...	...	37·85	Omagh

|| and 12, 28.

SUPPLEMENTARY RAINFALL, AUGUST, 1907.

Div.	STATION.	Rain inches	Div.	STATION.	Rain. inches
II.	Abinger Hall	3·69	XI.	Rhayader, Tyrmynydd	4·32
,,	Ramsgate	1·31	,,	Lake Vyrnwy	...
,,	Hailsham	1·62	,,	Llangyhanfal, Plâs Draw....	2·32
,,	Crowborough, Uckfield Lodge	2·75	,,	Criccieth, Talarvor	3·13
,,	Totland Bay, Aston House.	1·32	,,	Llanberis, Pen-y-pass	16·98
,,	Emsworth, Redlands	1·84	,,	Lligwy	4·40
,,	Alton, Ashdell	3·04	,,	Douglas, Woodville	4·22
,,	Newbury, Welford Park	2·02	XII.	Stoneykirk, Ardwell House	4·33
III.	Harrow Weald, Hill House.	1·72	,,	Dalry, The Old Garroch	6·93
,,	Oxford, Magdalen College...	1·25	,,	Langholm, Drove Road	7·57
,,	Bloxham Grove	2·19	,,	Moniaive, Maxwelton House	5·10
,,	Pitsford, Sedgebrook	2·49	XIII.	N. Esk Reservoir [Penicuick]	4·85
,,	Huntingdon, Brampton	2·07	XIV.	Maybole, Knockdon Farm..	2·72
,,	Wisbech, Bank House	2·07	XV.	Campbeltown, Witchburn...	5·55
IV.	Southend Water Works	1·64	,,	Inveraray, Newtown	9·97
,,	Colchester, Lexden	2·00	,,	Ballachulish House	9·84
,,	Newport, The Vicarage	2·19	,,	Islay, Eallabus	6·59
,,	Rendlesham	1·48	XVI.	Dollar Academy	5·57
,,	Swaffham	1·98	,,	Loch Leven Sluice	4·16
,,	Blakeney	1·91	,,	Balquhidder, Stronvar	8·25
V.	Bishops Cannings	3·09	,,	Perth, Pitcullen House	3·56
,,	Ashburton, Druid House	1·42	,,	Coupar Angus Station	3·78
,,	Okehampton, Oaklands	2·97	,,	Blair Atholl	4·06
,,	Hartland Abbey	2·70	,,	Montrose, Sunnyside Asylum	2·41
,,	Lynmouth, Rock House	2·86	XVII.	Alford, Lynturk Manse	2·71
,,	Probus, Lamellyn	1·32	,,	Keith Station	3·20
,,	Wellington, The Avenue	...	XVIII.	N. Uist, Lochmaddy	5·10
,,	North Cadbury Rectory	2·28	,,	Alvey Manse	3·06
VI.	Clifton, Pembroke Road	2·29	,,	Loch Ness, Drumnadrochit.	2·81
,,	Ross, The Graig	2·66	,,	Glencarron Lodge	9·10
,,	Shifnal, Hatton Grange	2·88	,,	Fearn, Lower Pitkerrie	1·39
,,	Cheadle, The Heath House.	3·62	XIX.	Invershin	3·09
,,	Blockley, Upton Wold	2·41	,,	Altnaharra	3·04
,,	Worcester, Boughton Park.	2·26	,,	Bettyhill	4·93
VII.	Market Overton	2·44	XX.	Dunmanway, The Rectory..	6·08
,,	Market Rasen	2·41	,,	Cork	...
,,	Bawtry, Hesley Hall	1·96	,,	Darrynane Abbey	5·72
VIII.	Neston, Hinderton Lodge...	2·95	,,	Glenam [Clonmel]	2·54
,,	Southport, Hesketh Park...	3·70	,,	Ballingarry, Gurteen	3·40
,,	Chatburn, Middlewood	4·93	,,	Miltown Malbay	5·64
,,	Cartmel, Flookburgh	4·81	XXI.	Gorey, Courtown House	2·42
IX.	Langsett Moor, Up. Midhope	3·23	,,	Moynalty, Westland	3·12
,,	Scarborough, Scalby	1·57	,,	Athlone, Twyford	3·33
,,	Ingleby Greenhow	2·39	,,	Mullingar, Belvedere	3·15
,,	Mickleton	2·32	XXII.	Woodlawn	4·62
X.	Bardon Mill, Beltingham	..	,,	Westport, Murrisk Abbey..	...
,,	Ewesley, Fallowlees	2·99	,,	Collooney, Markree Obsy..	4·02
,,	Ilderton, Lilburn Cottage...	2·10	,,	Mohill	3·51
,,	Keswick, York Bank	4·93	XXIII.	Enniskillen, Portora	...
XI.	Llanfrechfa Grange	3·89	,,	Warrenpoint, Summer Hill.	2·85
,,	Treherbert, Tyn-y-waun	9·23	,,	Banbridge, Milltown	2·69
,,	Carmarthen, The Friary	4·71	,,	Belfast, Springfield	3·95
,,	Castle Malgwyn [Llechryd].	3·26	,,	Bushmills, Dundarave	5·28
,,	Plynlimon	14·35	,,	Stewartstown, The Square..	3·14
,,	Crickhowell, Ffordlas	2·40	,,	Killybegs	7·48
,,	New Radnor, Ednol	3·90	,,	Horn Head	5·27

METEOROLOGICAL NOTES ON AUGUST, 1907.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Temp. for Temperature; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; TS for Thunderstorm; R for Rain; H for Hail; S for Snow.

CAMDEN SQUARE.—Another month of low temp., the mean being 60°·8, or 1°·3 below the average: the max. temp. was low throughout. Unsettled weather prevailed during the third week with T at times, and a violent squall occurred on 20th, accompanied by T, L, R and H. Duration of sunshine 149·7* hours, and of R 27·3 hours.

CROWBOROUGH.—Low temp. and frequent R up to 22nd, after which warmer and more settled. R ·24 in. below the average of 36 years. Mean temp. 58°·1, or 2°·1 below the average.

BURY ST. EDMUNDS.—Cold and dull, with little sunshine except in the last week. Corn ripened very slowly, and much was not yet fit to cut at the end of the month.

TORQUAY.—Duration of sunshine 189·6* hours, or 17·9 hours below the average. Mean temp. 60°·6, or 1°·0 below the average.

NORTH CADBURY.—A cool, cloudy and showery August, windy from 6th to 23rd, but quiet and warm at the end.

WOLSTASTON.—Cold and wet with insufficient sunshine. On 20th a frost occurred in the air, which is unprecedented in August.

BOLTON.—The temp., particularly that of the earth, was again very low. Mean temp. 55°·1, or 2°·7 below the average. Duration of sunshine 104·6* hours, or 13·7 hours below the average. Crops were late and harvest conditions bad.

SOUTHPORT.—Cool, but chiefly remarkable for abnormal prevalence of strong S.W. and W. winds. Mean temp. 57°·5, or 1°·8 below the average. Duration of sunshine 163* hours, or 17 hours below the average. Duration of R 68·3 hours. Water levels were very high.

CARMARTHEN.—Wet and cold. The hay harvest was much retarded by constant R, and corn was a good deal beaten down, but forage was plentiful.

HAVERFORDWEST.—Generally cold and unsettled, with considerable R. Corn crops were much damaged by R and strong winds. Duration of sunshine 151·2* hours.

DOUGLAS.—A most unseasonable month, nearly if not quite as bad as June. It was cold, wet, gloomy and extremely windy, with hardly one calm or summer-like day to redeem its evil character.

CARGEN.—Wet and sunless, with strong W. winds whenever it did not rain. Hay was much damaged, and corn wherever heavy was considerably "lodged"; the harvest was not commenced at a date three weeks later than in 1906.

STRONVAR.—Extremely wet and cold, with very little sunshine and high N.W. winds.

COUPAR ANGUS.—The coldest August since 1888. Mean temp. 53°·6, or 2°·0 below the average. It was the fourth successive month with low temp., and the fifth with R above the average.

DRUMNADROCHIT.—R ·12 below, and rain days 4 above, the average of 21 years.

DUNMANWAY.—Very fine from 19th to 27th, and warm from 23rd to 27th. Great TS on 11th, with vivid L, lasting two hours, and ·76 in. of R between 7.30 and 10.30 p.m.

DARRYNANE ABBEY.—Raw and ungenial, with few fine days. R 25 per cent. above the average.

MILTOWN MALBAY.—Continuously wet, with only two bright days. The temp. was low, and hay, corn and turf was rotting.

DUBLIN.—Changeable, cool, breezy and showery, with constant fresh westerly winds. Mean temp. 58°·8, or 0°.9 below the average.

BANBRIDGE.—R ·72 in. below the average of 45 years.

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* Campbell-Stokes.

Climatological Table for the British Empire, March, 1907.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Date.	Absolute. Minimum. Temp.	Date.	Average. Max.	Min.	Dew Point.	Humidity.	Absolute. Max. in Sun.	Max. on Grass.	Total Rain Depth.	Days.	Aver. Cloud.
	°		°		°	°	°	(0-100)	°	°	inches		
London, Camden Square	68·7	31	24·4	12	54·4	35·2	37·8	84	101·1	23·1	·97	13	...
Malta	...	...	...	...	...	...	...	...	...	...	...	...	...
Lagos	91·5	19	73·0	2	89·4	78·8	75·1	71	156·0	70·0	2·65	4	7·4
Cape Town	91·0	9	55·0	16	76·5	60·3	57·0	69	...	...	·83	5	3·5
Durban, Natal ...	89·1	8	62·1	26	83·7	68·2	...	...	147·1	...	1·96	14	4·4
Johannesburg	79·0	6	49·0	26	74·0	54·8	55·6	79	161·0	48·8	2·86	8	3·6
Mauritius	87·2	15	69·0	11	83·9	71·4	70·4	79	155·3	62·7	7·31	20	6·6
Calcutta	93·7	9	58·0	1	87·8	67·5	64·6	68	153·0	51·2	4·02	5	3·8
Bombay...	90·4	31	70·7	14	86·6	73·9	69·3	71	132·9	62·9	·00	0	0·8
Madras	95·1	23	66·2	4	89·7	73·4	71·5	76	144·5	62·1	·00	0	2·3
Kodaikanal	72·0	15	46·0	2	68·4	51·0	44·6	64	144·2	35·2	1·79	12	3·1
Colombo, Ceylon ...	92·4	11	71·1	1	89·1	74·8	72·1	73	152·0	68·2	1·06	13	3·6
Hongkong	80·1	25	48·5	2	63·4	59·7	58·7	80	131·2	...	·34	7	8·0
Melbourne	88·9	11	43·0	27	71·2	52·9	48·7	64	146·5	31·9	1·68	9	5·6
Adelaide	89·8	11	46·5	22	75·3	55·2	49·5	58	146·0	38·3	·81	6	4·2
Coolgardie	95·9	9	50·0	13	79·8	58·6	55·8	62	165·2	46·8	5·27	9	4·4
Sydney	90·0	5	51·4	27	74·3	61·1	58·5	76	127·3	46·0	8·42	21	6·8
Wellington	77·5	12	47·6	21	67·2	57·5	54·6	74	126·0	33·0	5·49	11	6·0
Auckland	77·0	5	54·0	20	72·0	61·7	59·1	79	140·0	49·0	·97	7	5·7
Jamaica, Negril Point.	88·8	16	62·3	10	85·6	66·2	64·3	65	...	...	·08	1	...
Trinidad	90·0	16	66·0	several	85·4	69·4	70·6	78	159·0	64·0	1·71	9	...
Grenada	...	...	...	...	...	...	...	...	...	...	...	...	...
Toronto	...	...	...	...	...	...	...	...	...	...	...	...	...
Fredericton	50·3	30	-17·2	1	35·0	11·6	...	67	...	...	·41	2	5·0
St. John's, N.B. ...	52·3	29	- 3·2	5	36·0	19·6	...	...	...	...	·75	6	5·3
Victoria, B.C.	57·0	20	28·7	30	49·6	35·2	...	...	...	...	1·40	14	5·7
Dawson	33·0	9	-41·5	21	9·8	-15·4	...	.	...	...	·00	0	3·8

Johannesburg.—Bright sunshine 255·8 hours, or 70 per cent. of the possible amount.

Mauritius.—Mean temp. of air 0°·1, dew point 0°·2, relative humidity 1·0 per cent., and R 1·28 in. below, averages. Mean hourly velocity of wind 6·8 miles, or 3·6 miles below average.

MADRAS.—Bright sunshine 261·1 hours.

KODAIKANAL.—Bright sunshine 245 hours.

COLOMBO.—Mean temp. of air 81°·9 or 0°·2 below, of dew point 0°·8 below, and R 3·54 in. below, averages. Mean hourly velocity of wind 6·9 miles. T88 on 3 days.

HONGKONG.—Mean temp. of air 63°·8. Bright sunshine 86·8 hours. R 2·30 in. below average. Mean hourly velocity of wind 12·8 miles.

Adelaide.—Mean temp. of air 4°·9 below, and R ·26 in. below, averages. The coldest March in the 50 years' records.

Sydney.—Mean temp. of air 1°·5 below, and R 3·20 in. above, averages.

Wellington.—Mean temp. of air 1°·8 above, and R 2°·09 in. above averages.

Symons's Meteorological Magazine.

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THE DROUGHT OF SEPTEMBER, 1907.

THE long-deferred spell of genuine summer weather which came in September, following a dismal succession of cold and gloomy months, has elicited a chorus of praise in the daily press, and we conclude that the absence of rain was viewed with no little satisfaction both by the agriculturalist and the pleasure-seeker. Crops in many places, after causing no little anxiety, ripened with great rapidity, and in Scotland we believe that what promised to be a late harvest was converted into an unusually early one.

Under the influence of settled anti-cyclonic conditions, the prevailing weather in different parts of the British Isles was of a remarkably uniform type, and, broadly speaking, it was only in Scotland and the south of Ireland that any rain of consequence fell after the 6th day of the month. The absolute drought resulting was therefore unusually prolonged, especially taking into account the wide area over which it was spread. On the average of about twenty years, the longest drought of the year at any one station in the British Isles is 25 days, whereas in the present instance not one station only but large tracts of the country were entirely without rain for this period. The accompanying map shows by the unshaded area on the land those parts where a technical "absolute drought" occurred, *i.e.*, a period of more than 14 consecutive days with no rain recorded. In parts of the north-west of England a period of 25 or 26 days was cut in half by an entry of ·01 in of "rain" occurring midway, and this was sometimes the result of fog-condensation, itself an indication of the continuance of unbroken anticyclonic influence. The map thus shows less rather than more of the drought which took place. However, it brings out well the absence of absolute drought over the greater part of Scotland and Ireland, which are shaded, and throws into contrast the large area, including practically the whole of Wales, the west Midlands and the Wessex region within the dotted line, over which from 20 to 25 consecutive days passed without measurable rain. It is rather striking that the drought was best established over the normally wettest districts of the Welsh uplands. In the eastern half of England a little rain on or about the 25th curtailed the period to about 18 days, after which it was dry again.

The amount of rain during the whole of September was unusually small over the whole country, and it is a rare occurrence in any month for so considerable a proportion of the British Isles to receive less than an inch. The most noticeable feature was the extraordinary uniformity of the fall over England and Wales, where it scarcely differed from ·60 in. to ·70 in. at any stations except in the hills of Cumberland and Wales and in the Cornish peninsula. A narrow strip on the east coast of England, including Northumberland, had less than half an inch.

ON SOME OF THE CAUSES AND EFFECTS OF ATMOSPHERIC ELECTRICITY.

By L. C. W. Bonacina.

When in the eighteenth century Franklin, together with Dalibard and Richmann, experimentally demonstrated beyond doubt that lightning was an electric discharge, he laid the foundations of the science of atmospheric electricity, the phenomena of which, though they have in more recent times formed the subject matter of a large number of theories, are still very imperfectly understood with regard to their causes and effects. Franklin's views upon electrical science in general may appear somewhat crude to those who are acquainted with the abstruse conceptions of modern physics upon such matters, just as does, for instance, the theory of light of the great Newton, the archetype of the natural philosopher; but, as regards this subject of atmospheric electricity, it may be said that the knowledge of solid facts such as that established by Franklin is sorely needed if the application to the problems of the atmosphere of advanced physical theory is to be productive of fruitful results.

To account for the origin of the electricity of our atmosphere, various natural operations conducted on an extensive scale upon the Earth's surface—such as the physical processes involved in evaporation, or the chemical processes in vegetation, animation and organic decomposition—have been invoked; but hitherto it has been generally considered that the only known agent adequate to explain the observed electrification of the air is friction—the friction of bodies against one another through the instrumentality of wind.

The discovery of "ionization" of the atmospheric gases, however, akin to that of salts in solution, has indicated further very probable sources of electricity. In order to gain a clearer understanding of the nature of ionization, let us refer to the phenomena of the Crookes' vacuum tube, together with those connected with the property of radio-activity which is possessed in so marked a degree by the recently discovered element radium. In the first place, what is radio-activity? and what grounds are there for believing it to constitute a factor in electrifying the air? It would be impossible to answer these questions adequately within the limits of a meteorological article, but it may be well to explain the essential idea of the theory of radio-activity in the interests of the present subject. Firstly, it is necessary to distinguish between two kinds of radiation which may be emitted from bodies—namely, the ordinary radiation and radio-activity.

By the ordinary radiation we mean the energy which is transmitted through, or rather by means of, the ether by a body in virtue of the energy possessed by the body in the form of heat or molecular motion. Any body, then, whatever its temperature may be, short of absolute zero, is always emitting and absorbing radiant energy, whether it rises or falls in temperature depending upon the balance

between loss and gain. This species of radiant energy consists, as is well known, of vibrations in the ether, the wave-lengths increasing from the ultra-violet actinic rays to the infra-red or dark "heat" rays, or, further still, to the very long "electric" waves of Hertz. How much of the spectrum is represented in the radiation from any particular body at any time depends upon its chemical and physical constitution as well as upon its temperature, and is a purely physical question. The important thing to note is that the heat energy of the body—the vibratory or kinetic energy of its molecules—is transmitted across the ether in what Maxwell believed to be electro-magnetic waves, and that the communication of energy from molecules to ether is effected in a special manner which it would here be irrelevant to discuss in accordance with the present electronic view of matter.[1]

We shall now be able to obtain a clearer conception of what is meant by radio-activity, or the "extraordinary" form of the radiation of energy. A body like radium which exhibits the phenomenon of radio-activity is conceived to be in a state of atomic rupture or disentegration, its atoms undergoing decomposition into lighter ones. This phenomenon is conspicuous in certain chemical elements which have very heavy atoms, or, in the language of chemistry, are of high atomic weight, and the atomic explosion, as we might call it, which is made manifest by it naturally gives rise to molecular or thermal disturbances within a radio-active body, thus producing the ordinary kind of radiation as well.

From the cathode of a Crookes' vacuum tube connected with an induction coil something of a very interesting nature is shot off. These cathode rays were designated by Crookes about thirty years ago as matter in a "fourth state," and for a long time their nature remained most puzzling to physicists. Without entering into details as to the various properties of the cathode rays, it may be said at once that they consist of inconceivably minute particles torn away from the cathode, and each of these particles is called an "electron."

Professor J. J. Thomson, of the Cavendish Laboratory, Cambridge, upon the basis of an extensive and brilliant series of experiments a few years ago, calculated the mass of an electron to be about $\frac{1}{700}$th of that of the lightest known atom of matter, namely, hydrogen, and its velocity in the vacuum tube about $\frac{1}{10}$th that of light, or 18,000 to 19,000 miles a second. Now, particles essentially identical with electrons are emitted from radium and other radio-active bodies. In accordance with the electric theory of matter, which rests upon a high degree of probability, but cannot yet be conclusively proved, we may regard the electron as an atom of negative electricity or as the unit electric charge; and an atom of matter as a structure, the dynamics of which is at present the subject of much discussion, composed of a number of these negative charges or electrons in

[1] See, for instance, Sir Oliver Lodge, *Phil. Trans.*, 1893, Vol. **184**, p. 750.

association with positive charges. Thus is matter expressed in terms of electricity.

This is truly a magnificent doctrine ;[2] but I have here endeavoured to outline it in the fewest words possible. The bearing of these theoretical questions upon the subject in hand will now be apparent. For the sun is an intensely radio-active body, and the radiator not only of the electro-magnetic waves which constitute light and dark "heat" rays, convertible more or less into heat upon striking matter, but also of electrons which probably after electrifying the upper air cause an accumulation of negative electricity on the Earth's surface, and, constituting electric currents of moderate strength, originate magnetic storms and auroral displays. When they enter the Earth's atmosphere these electrons partially "ionize" the molecules of the atmospheric gases, that is to say, decompose them into their constituent atoms, which, being oppositely charged, form positive and negative "ions" (anions and kations), much in the same way as the molecules of, say, chloride of sodium, or sulphate of copper when dissolved in water, undergo partial decomposition (by the mere process of solution) into the charged bodies or ions,

$$\overset{+}{\mathrm{Na}},\ \overset{-}{\mathrm{Cl}} \text{ and } \overset{+}{\mathrm{Cu}},\ \overset{-}{\mathrm{SO_4}}$$

respectively which can be separated by passing an electric current through the solution. Another potent source[3] of electrons causing ionization of the upper air is believed to be the action of ultra-violet light upon the ice or snow particles of high-level cirrus clouds, and the causes of ionization in the atmosphere are thought to be numerous.

There are then at least two general sources of atmospheric electricity, (1) mechanical friction ; (2) ionization.

It is now expedient to inquire into the effects of the electrification of the atmosphere or the meteorological phenomena due to its existence. The subject may be conveniently divided into : (*a*) the influence of electricity upon the condensation of aqueous vapour, (*b*) the manifestation of electricity in thunderstorms and in auroral displays, magnetic storms and kindred phenoma, (*c*) thermo-dynamic effects. Owing to the limitation of space I shall, in this article, only be able to dwell upon the first division.

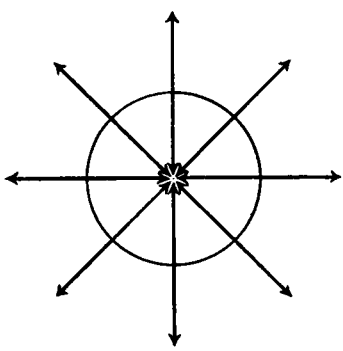
It has hitherto been supposed that in air deprived of dust aqueous vapour will not condense when the temperature of saturation is reached. Aitken showed that for condensation to take place nuclei must be present to serve as points of attachment to drops of water.

[2] For a clear exposition of this theory, Sir Oliver Lodge's excellent book on "Electrons" may be consulted. (London : George Bell & Sons, 1906.)

[3] It has recently been argued on mathematical grounds that electrons must be limited in their approach to a magnetized body like the Earth to the region near the magnetic poles. (See *Nature* for September 5th, 1907, p. 481.) However this may be it is not supposed, as indicated above in the text, that the atmosphere in general depends for ionization upon the discharge of solar electrons alone.

The required nuclei have been supposed to be supplied by the impalpable dust consisting of diverse materials generally present in the air even at high levels. No one doubts but that dust plays an important part; but, inasmuch as the quantity of dust decreases very rapidly upwards, one cannot positively assert without direct evidence that it is always sufficient to minister to the wants of every mass of saturated vapour. It is known, however, to physicists that "ions" can also serve as condensation nuclei, and it is consequently inferred that the ions of the atmosphere give rise to the condensation of moisture. This brings us at once to the consideration of the theory of condensation nuclei in general, whether they be dust particles or ions. In the first place Lord Kelvin has shown that an infinitesimal globule of liquid cannot exist, it must immediately vapourize. If, however, such a globule can attach itself to a surface of finite curvature, such as that afforded by a dust particle, then it will pass into a stable liquid condition if its temperature is below the vapour-saturation point.

Ions, it will be remembered, are *atoms bearing a charge of electricity*; those present in the atmosphere will, therefore, generally be charged atoms of oxygen or nitrogen. Although a minute globule of water possessing an infinitely convex surface cannot exist in the ordinary condition it can do so if in the electrified condition. The reason of this is explained mathematically by physicists.[4] A drop of water by reason of the curvature of its surface experiences a radial-component of surface tension directed inwards, and therefore an increased internal pressure; whereas, in virtue of its surface electrification, it is subjected to an electric tension directed outwards. These two antagonistic forces operating upon the globule of water, I represent in the annexed diagram. The circle represents a plane section of the spherical water droplet; the interior arrows show the direction of the radial-pressure component of the surface tension, and the exterior that of the electric tension due to the uniform surface charge. There is a certain critical size at which the ionic charge (*vide ut supra*) will balance, so far as condensation is concerned, the surface tension, so that the convex electrified droplet will act as though it were unelectrified and flat, that is to say, it will be able to have a stable liquid existence. The critical size is of the order 10^{-21} c.c. ($\frac{1}{1,000,000,000,000,000,000,000}$ cubic centimeter); in other words, it is of atomic dimensions. Hence, it is inferred that an ion



[4] J. J. Thomson, "Applications of Dynamics to Physics and Chemistry." Lodge, "Electrons," p. 81.

(atom + electron) can play the part of a condensation nucleus. It thus appears that electricity may act as the initial impulse required to condense vapour when it is saturated. But it is further extremely probable that the small electrified drops so formed in the first stage of condensation are caused to coalesce in virtue of the charges upon them, and thus to continue the process. It was, indeed, experimentally determined by Lord Rayleigh[5] in 1879 that drops of water which are slightly and similarly electrified (the similar electric charges upon the drops not being strong enough to effect electrostatic repulsion) have a pronounced tendency to coalesce. I would here provisionally suggest that we have here at least a partial explanation of the characteristic difference between the cyclonic rain of winter and the thunder rain of summer. There is, of course, no line of demarcation between the two types of precipitation, but the extreme form of each is very distinct. The large drops and usually great concentration of the thunder rain are likely to result from the coalescence of cloud droplets produced in the first stage of condensation; droplets possessing a charge sufficient to effect such coalescence, but not sufficient supposing all the charges to be of like sign to engender mutual repulsion. In the case of the cyclonic rain, on the other hand, one may suppose the aggregation of small drops to form rain drops to be brought about mainly by mechanical or other means, the individual electric charges on the smaller drops being so insignificant that they cannot promote their growth, or at all events not to the same extent as in the thunder rain. It appears, therefore, that although the electric manifestations of thunderstorms certainly proceed from the condensation of vaporous masses involving the greatly increased concentration of electricity necessary for the occurrence of disruptive discharges, the condensation itself may partly result in two distinct ways from the operation of electricity in the atmosphere; so that whether it is correct to call condensation a cause or an effect of electrification depends very much on the terms of our electricity. I will not in this essay touch upon the electrostatic induction theory of thunderstorms as that is well known, so far indeed as it is applicable to the scanty and inadequate observations which we are able to make upon them.

[5] *Proceedings* of Royal Society, 1879, Vol. **13**, p. 406. "The Influence of Electricity on colliding Water Drops." From this article I quote the two following passages (the experiments were made with water-jets):—

"Instead of rebounding after collision as the unelectrified drops of clear water generally or always do, the electrified drops coalesce, and thus the jet is no longer scattered about. When the electrical influence is more powerful the repulsion between the drops is sufficient to prevent actual contact, and then, of course, there is no opportunity for amalgamation."

" . . . . . Now from what has appeared above we have every reason to suppose that the results of an encounter will be different according as the electrified condition of the particles, and we may thus anticipate an explanation of the remarkable but hitherto mysterious connection between rain and electrical manifestations."

The phenomenon of the aurora associated with those of sun-spots, magnetic storms, etc., has long been shrouded in mystery. The theory latterly proposed by Arrhenius, though in nowise proved, has at least the merit of being simple, definite and also very beautiful. The Earth's magnetic lines of force are thought to guide the electrons received from the sun in spiral courses away from the tropical regions towards the magnetic poles, where in the rarefied upper air there occur on a magnificent scale the phenomena of the vacuum tube. Hence the surpassing glory of the long winter nights.

The other remaining important effects of atmospheric electricity are difficult and complicated subjects, and their discussion must be left over for a future paper.

These effects[6] are concerned with the influence of ionization upon temperature in the several strata of the atmosphere and hence upon the diurnal variations of the barometric pressure, the gradient of electric potential and other periodic changes.

AERIAL NAVIGATION.

THE autumn of 1907 will be remembered as the time when the possibilities of navigating the air were finally proved beyond question. In France, in Germany, and in England, notable flights have been made by the military air-ships, in the perfecting of which all the great powers have been keenly interested for some years. The longest flight, and the greatest time in the air, appears so far as we can judge from the newspaper reports, to have been attained by Count Zeppelin's great air ship on the Lake of Constance; but none of the recorded efforts seem to have been more satisfactory than those of the British military air-ship at Aldershot. Colonel Capper and Mr. S. F. Cody had already made several preliminary flights at Aldershot, proving that the great sausage-shaped gas-bag which gave bouyancy to the platform carrying the motor and propellor could be controlled in its movements, both horizontally and vertically with perfect ease; ~~but on~~ Saturday, October 5th, they steered the *Nulli Secundus* from Aldershot to London, circled round St. Paul's, performed various evolutions over the Horse Guards, and, the wind having become too strong to permit of a return to Aldershot, they steered the aerial craft to the Crystal Palace, and descended gently in the midst of the enclosed cycle track. The success of aerial navigation must of necessity stimulate the study of meteorology, and it promises to open a new and fascinating area for meteorological research.

[6] "Studies on the Diurnal Periods in the Lower Strata of the Atmosphere." By F. H. Bigelow, U.S. Department of Agriculture, Washington, 1906.

Correspondence.

To the Editor of Symons's Meteorological Magazine.

THE DROUGHT OF SEPTEMBER, 1907, AT CLIFTON.

THE absolute drought of 25 days in this month, from the 6th to the 30th, was the longest experienced in 52 years, with the exception of one of 26 days, from February to March 1st, in 1897. This month was also the driest September in the above period, with the exception of September, 1865, when only ·05 of an inch of rain was measured.

It is noteworthy that we have now had four dry Septembers in succession, viz.:—1904, 1·54 in.; 1905, 1·33 in.; 1906, ·82 in. and 1907, ·62 in. The average for 34 years is 3·03 in.

ROBT. F. STURGE, F.R.Met.Soc.

101, Pembroke Road, Clifton, 5th October, 1907.

SEPTEMBER'S SUMMER.

SEPTEMBER fully upheld its title to be considered a real summer month in 1907, for it provided beautiful harvesting weather of sunshine and drought between the 6th and end of the month. It is true the temperature was not nearly so high as it was in 1895 and 1865, but the fine, dry period came at the end of a very disappointing season this year, and brought some recompence for the ungenial atmosphere prevailing in June, July and August. Looking back to old records it is perhaps a little curious that we had very hot Septembers in 1795, 1805, 1815, 1825, 1865, 1875, 1895, and that the month was very cold in 1820, 1830, 1840, 1850, 1860 and 1870; but 1810, 1880 and 1890 were extremely warm, while 1845 and 1885 proved cold, so that the sequency in decades is by no means regular. Yet it is sometimes interesting to point out any approach to cyclical variations in weather characteristics, for though they are usually the result of obvious coincidences, they nevertheless have a very suggestive and significant look about them.

Our recent experience will prompt us to assent to Orlando Whistlecraft's description of September, when he says, "This month when fine is one of the most delightful in the year for walking, riding, or driving, as the calm serenity, with the peculiarly beautiful clouds, and agreeable softness of temperature, yield the most pleasing sensations."—*Climate of England*, p. 11. W. F. DENNING.

Bishopston, Bristol, September 30th, 1907.

THE SUNSHINE RECORDER.

ALLOW me to express my appreciation of the article "Distribution of Bright Sunshine over the British Isles," given in the September number of your Magazine.

Mr. Curtis has given us some very useful and important information, and the table of hours duration in different latitudes will prove

of very practical use. We learn that the Campbell-Stokes recorder is accepted as the officially recognized instrument. But yet I believe that observers often find difficulty in giving a *faithful* result of the daily records; the discoloration is frequently so faint, or terminates in so sharp a point that the time of beginning and ending is almost impossible of correct estimation.

Now, very recently, I have observed when the sun has declined, say below 15 degrees of the horizon, with no clouds, that for nearly an hour there has been a clear bright spot running on the card, but no apparent mark left for determining the exact time. I do not know whether photography would reveal an impression. Can the card be made more sensitive—is it possible to bring in the aid of chemistry to perfect a contrivance which seems, in all other respects, to be the best sunshine recorder yet devised?

Deal, 30th September, 1907. TURNOR PEEL.

WANTED! A NAME.

COULD not a more convenient and appropriate name be found for the branch of science dealt with in your pages? "Meteorology" is awkward enough; "Meteorological" is worse, and might serve as a test for sobriety; and what Englishman will tackle that jaw-breaker, the *Meteorologische Zeitschrift*?

Meteorology is the science of meteors; but we have restricted the sense of that word. Again, it is the science of "things lifted up," of things above the earth; a primitive conception which might seem to include birds, &c. Formerly it included the heavenly bodies, and to-day it takes cognizance of the sun, prime cause of weather; also, at times, of the moon. These are both "up" and "down," or neither. Once more, we record underground temperature.

Why not "aerology"; though this has been lately proposed for a special line of inquiry! It might be interesting to have suggestions on the subject. A. B. M.

Gadebridge, Crouch End, September 10th, 1907.

THE SPECTRE OF THE BROCKEN.

LAST Friday, 20th September, I saw this phenomena very clearly from the cliffs here. There was a dense fog seaward and brilliant sunshine on the hill. A friend and I were walking near the East Cliff when we remarked the shadows of our figures thrown on the fog—the cliff is from 150 to 200 ft. high, and the lower part of the fog was in deep shadow—our figures appeared, as it were, walking on the top of the shadow. A halo, or corona appeared over our heads. Further on along the cliffs, whenever our shadows were thrown on the fog, the same phenomenon was repeated.

H. A. COSGRAVE.

Howth, Co. Dublin, September 27th, 1907.

A RARE CLOUD-FORM.

FOR the first time I witnessed the so-called Pocky or Pocket Cloud at Hampton Court, on August 15th, 1907, between 3.30 and 4 p.m. It consisted of about a score of seemingly huge black balls, well formed, touching each other, the upper part evidently extended cloud, as no blue sky could be seen in the interspaces. They sagged somewhat before passing into dense cumulus very slowly, no rain falling. These balls occupied a large space about the zenith, though not central there. They may have been apparent long before I noticed them; seemed stationary, and lost the globular formation with a scarcely perceptible motion, the air being nearly calm.

Believing this cloud to be very rare is my excuse for sending this note. Being my first interview, attention was fixed upon the Pocket, and I now find I should have estimated angles, etc.

R. STRACHAN.

61. Offord Road, N., 10th October, 1907.

THE STUDY OF WEATHER PHENOMENA.*

By Rev. D. C. BATES, F.R.G.S., F.R.Met.Soc.

NATURE-STUDY has only of recent years been recognised as a branch of education, or as a proper means of training the mind, and of equipping it with useful knowledge for the battle of life. Formerly, primary school teachers were almost entirely limited to drilling their scholars in the three "R's,"—reading, writing and arithmetic. Work was little less monotonous in the secondary schools, because the universities which set the standard for them so fostered the study of the classics and higher mathematics that those who sought degrees had ruthlessly to confine their studies to dead languages, or intricacies of calculation, so that even modern literature and languages (to say nothing of science) were neglected. Under those conditions real education had almost to commence when the doors of the school or college closed behind the students. But now even the oldest and most conservative universities have undertaken to teach and grant degrees in literature, science and art. In this way many of the best European and American universities now have regular or special courses in meteorology.

The weather is studied especially in the secondary schools of the United States of America, and a large proportion of the primary schools of that progressive country adopts it as an important branch of work.

The study of weather phenomena may be used as a means for training children in intelligent observation and accuracy, attention and patience; the memory is cultivated by practical illustrations

* A paper read to a gathering of teachers at the Training College, Wellington, N.Z., August 1st, 1907.

and associations, not only of the weather phenomena with each other, but with their actual results, and in this respect the reasoning faculties are exercised in the study of cause and effect. Lastly, such knowledge is often obtained that the person so trained develops capabilities for the forecast of local weather. It must not, however, be expected that all who study weather will become "weather-wise," or learned in coming changes, yet if once the art of forecast be acquired in any degree, it cannot possibly be neglected or grow rusty for want of use in any temperate region of the Earth, such as this in which it is our happy lot to find ourselves, though even here some who really ought to know better do little else but grumble at the weather.

Thus it is that phenomena which are hardly observed cannot be remembered, associated with other examples and used as an experience in life. "One eye in all Verona saw the beauty of that sky," could often be repeated of many a crowded city, where men hardly know which way the wind blows.

At sea and in the country it is different, for there the weather is the dominant topic of conversation, and all business and pleasure directly depend upon it. Consciously or unconsciously everybody there studies it more or less, but to get the best results even in the study of weather the mind needs direction and training. Country teachers have in their scholars wonderful opportunities for good work, which are not always recognized and appreciated at their full due. An American writer indicates these when speaking of larger issues he wrote :—"The country boy is often more successful than the city bred boy, partly because he has developed habits of personal observation and experience ; because he has had natural and not artificial things around him. He sees nature in a large way and is quick to grasp conditions and foresee results."

Meteorology can undoubtedly assist you in your work as a teacher. In its elementary form it has manifold and fundamental relationships to other branches of learning, such as geology, chemistry, astronomy, biology, and above all geography. We go from the known to the unknown, step by step, line upon line we acquire knowledge, and before we can really be thought to hold it, we must attach our impressions one by one to some fact already in the storehouse of our own knowledge and experience. Meteorology may furnish a valuable link in many a chain of association because a knowledge of climatic conditions often illustrates and explains the phenomena of natural science and human history. Thus practical acquaintance with the seasons in their varying phases of temperature, wind, rainfall, &c., when definite and accurate, may be used not only as a basis of comparision in estimating climates, but also as the standard by which we gauge results in the products of the Earth and of human activities.

It is not necessary to purchase either an extensive literature or an expensive equipment of instruments, before we commence the study

of weather phenomena. Much that is well worth doing and may be well done is accomplished with only simple methods of study in the book of Nature itself. Those who postpone their studies in meteorology until they can get a supply of expensive instruments, are in thus placing their uncertain hopes in the dim and distant future, really neglecting the root of the matter, and in great danger of having no foundations for the scientific study of weather, should they ever become the possessors of a meteorological observatory. They may become very useful to meteorological science, but not having the root of the matter in them, they frequently only become drudges at statistics. An observant and thoughtful child who may know nothing about barometers, thermometers, anemometers, &c., but who watches the skies, will after all be a better guide to the weather than they, for instrumental knowledge is but a poor substitute for meteorological science. Writing about the study of the clouds John Ruskin once said :—"There is no study open to you in all the expanse of science where so much can be done by dexterous attention and patience, *without the aid of costly instruments*, and in the lovely and healthy laboratory of the air." At another time the same writer described meteorology in the following terms :—"It is a science of the pure air, and the bright heaven ; its thoughts are amidst the loveliness of creation ; it leads the mind, as well as the eye, to the morning mist, and the noonday glory, and the twilight cloud, to the purple peace of the mountain heaven, to the cloudy repose of the green valley ; now expatiating in the silence of stormless ether, now on the rushing wings of the wind. It is indeed a knowledge which must be felt to be, in its very essence, full of the soul of the beautiful. For its interest it is universal ; unabated in every place and in all time. He whose kingdom is the heaven can never meet with an uninteresting space, can never exhaust the phenomena of an hour ; he is in a realm of perpetual change, of eternal motion, of infinite mystery. Light and darkness, cold and heat, are to him as friends of familiar countenance, but of infinite variety of conversation, and while the geologist yearns for the mountain, the botanist for the field, and the mathematician for the study, the meteorologist, like a spirit of higher order than any, rejoices in the kingdoms of the air."

(To be continued.)

REVIEWS.

Second Annual Report of the Meteorological Committee to the Lords Commissioners of His Majesty's Treasury. For the year ended 31st March, 1907. Presented to both Houses of Parliament by command of His Majesty. London, Stationery Office, 1907. Size 9½ × 6. Pp. 150. Price 1s. 7d.

THE Report mentions that Professor W. Somerville has resigned his membership of the Committee and Professor T. H. Middleton, his

successor at the Board of Agriculture, has taken his place. The property of the former Meteorological Council (a limited company which has been wound up in accordance with the provisions of the Companies Acts) has now been vested in the Administrative Secretary of the Treasury and the Director of the Meteorological Office for the time being as Trustees for the Committee.

The Post Office, we are not surprised to learn, has not been induced to take any steps towards facilitating the dispatch of storm warnings by telegraph, nor does it seem to have thought of employing the ever-open offices of the trunk telephone exchanges for this service. So it will continue to happen that telegraph wires will occasionally be blown down before the warning of the avenging storm has been permitted to pass along them.

The Committee throws out the suggestion that a meeting of the Meteorologists of the British Empire might advantageously be held in Canada at the end of May, 1908, and there is no doubt that such a meeting would serve as a stimulus to the various meteorological services.

Various modifications have been made in the weather charts in order to give effect to the larger area from which telegraphic reports are now received, and new methods for preparing forecasts are in course of development.

A great amount of research is in progress under the auspices of the Committee, and it is evident that it takes an entirely different view of the functions of a Government Meteorological Service from that which has generally been held hitherto. This cannot fail to be of great benefit to the science and to the country if complete co-operation can be secured with other meteorological organizations, and if the great influence which the Meteorological Committee can exert is brought to bear on the amelioration of the somewhat hard conditions in which some of those bodies have to work.

Observing and Forecasting the Weather. Meteorology without Instruments. By D. W. HORNER, F.R.Met.Soc. London, Witherby and Co., 1907. Size $7\frac{1}{2} \times 5$. Pp. 48. Price 6d. net.

MR. HORNER is an enthusiastic meteorological observer and his keen interest in the subject gives a heartiness to this booklet which many more pretentious publications do not possess. Limited to non-instrumental observations and written in a style which we may characterize as pleasantly discursive, the little work will, we are sure, suit the tastes of many who are not disposed to tackle the more formal and statistical aspects of a science which in truth deals with matters various enough to appeal in some measure to all.

METEOROLOGICAL NEWS AND NOTES.

DR. H. R. MILL WILL LECTURE on "Rain," in connection with the Gilchrist Educational Trust, at Normanton, on Monday, November 4th; at Cleckheaton, on Tuesday, November 5th; at Great Harwood, on Wednesday, November 6th; at Radcliffe, on Thursday, November 7th; and at Bury, on Friday, November 8th. He hopes to be able to visit rainfall observers in the adjacent parts of Yorkshire and Lancashire during the week of the lectures.

HEAVY RAINS IN SEPTEMBER and the early part of October have produced devastating floods in the south of France and of Spain. Large tracts of country in the Mediterranean departments of France have been inundated, towns have been isolated by the destruction of the connecting roads, railways, telegraphs and telephones, and immense damage has been done to property. Many lives also have been lost. We hope to give fuller particulars in an early number.

THE ALPS AS A WEATHER DIVIDE have attracted some attention on the continent. We may accordingly put on record a recent experience when entering the St. Gothard tunnel on the south side in brilliant sunshine under a cloudless sky, we emerged in thirteen minutes on the north side in a fog so dense that it was difficult to believe we had left the tunnel. The fog diminished as we descended, but the evening was dull and gloomy all the way to Bâle.

MESSRS. PASTORELLI & RAPKIN have forwarded for our inspection their Peandar set of instruments, the somewhat puzzling name representing the initials of the firm. The set is sold at the very moderate price of £6 6s. without, and £7 18s. 6d. with, Kew certificates: the additional cost should be cheerfully incurred by any purchaser as instruments without certificates are not complete for scientific purposes. The set consists of a neat Fortin pattern barometer reading by a vernier to ·01 in., a wet bulb, dry bulb, maximum and minimum thermometer and a standard Snowdon rain gauge. The instruments are well made, the only criticism we have to offer on them being that the barometer should be provided with an attached thermometer, and that some form of screen for the proper exposure of the thermometers must be provided by the observer.

MESSRS. DARTON & CO. have sent us their new illustrated price list of meteorological and other instruments. The instruments, as illustrated, appear to be of good construction and moderate price. Some obsolete patterns of rain gauges appear but prominence is given to the standard patterns, and the list will interest many of our readers.

AN OLD RAINFALL OBSERVER writes to us that the state of his health making it necessary for him to cease observing, he presented his rain gauge to the authorities of a public park in the neighbourhood, hoping that they would set it up and appoint someone to look after it. "They, however," he says, pathetically, "decided to place it in the museum as a curiosity."

TEMPERATURE FOR SEPTEMBER, 1907.

STATION.	COUNTY.	Lat. N.	Long. W. [*E.]	Height above Sea. ft.	TEMPERATURE. Max.		TEMPERATURE. Min.		No. of Nights at or below 32° Shade.	No. of Nights at or below 32° Grass.
		° ′	° ′		°	Date.	°	Date.		
Camden Square	*London*	51 32	0 8	111	80·1	25	38·0	23	0	0
Tenterden	*Kent*	51 4	*0 41	190	78·0	13	39·5	24	0	...
West Dean	*Hampshire*	51 3	1 38	137	76·0	12	29·0	23	2	13
Hartley Wintney	,,	51 18	0 53	222	75·0	13, 17	30·0	23	2	4
Hitchin	*Hertfordshire*	51 57	0 17	238	79·0	25	32·0	22	1	...
Winslow (Addington)	*Buckinghamshr.*	51 58	0 53	309	78·0	25	30·0	24	2	3
Bury St. Edmunds (Westley)	*Suffolk*	52 15	*0 40	226	79·8	25	36·0	24	0	2
Brundall	*Norfolk*	52 37	*1 26	66	79·0	25	32·6	23	0	2
Winterbourne Steepleton	*Dorset*	50 42	2 31	316	79·7	9	31·6	23	1	2
Torquay (Cary Green)	*Devon*	50 28	3 32	12	71·8	13	44·2	15	0	0
Polapit Tamar [Launceston]	,,	50 40	4 22	315	75·5	8	34·0	24	0	3
Bath	*Somerset*	51 23	2 21	67	75·0	12	35·2	23	0	0
Stroud (Upfield)	*Gloucestershire*	51 44	2 13	226	73·0	8	41·0	23	0	...
Church Stretton (Wolstaston)	*Shropshire*	52 35	2 48	800	72·0	12	26·0	4	2	...
Coventry Kingswood	*Warwickshire*	52 24	1 30	340	68·0	12	41·0	24	0	...
Boston	*Lincolnshire*	52 58	0 1	25	73·0	25	39·0	24	0	...
Worksop (Hodsock Priory)	*Nottinghamshire*	53 22	1 5	56	75·2	12	32·2	24	0	6
Derby (Midland Railway)	*Derbyshire*	52 55	1 28	156	78·0	28	34·0	22	0	...
Bolton (Queen's Park)	*Lancashire*	53 35	2 28	390	75·0	25	35·3	4	...	...
Wetherby (Ribston Hall)	*Yorkshire, W.R.*	53 59	1 24	130	...	...	...	...	...	...
Arncliffe Vicarage	,, ,,	54 8	2 6	732	...	...	...	...	...	...
Hull (Pearson Park)	,, *E.R.*	53 45	0 20	6	73·0	12, 13	33·0	4	0	1
Newcastle (Town Moor)	*Northumberland*	54 59	1 38	201	...	...	...	...	...	...
Borrowdale (Seathwaite)	*Cumberland*	54 30	3 10	423	77·2	28	32·9	4	0	...
Cardiff (Ely)	*Glamorgan*	51 29	3 13	53	...	...	...	...	...	...
Haverfordwest (High Street)	*Pembroke*	51 48	4 58	95	71·4	12	38·2	4	0	...
Aberystwyth (Gogerddan)	*Cardigan*	52 26	4 1	83	79·0	25	29·0	3	...	...
Llandudno	*Carnarvon*	53 20	3 50	72	73·8	9	39·5	4	0	...
Cargen [Dumfries]	*Kirkcudbright*	55 2	3 37	80	78·0	28	29·0	4	1	...
Lilliesleaf (Riddell House)	*Roxburgh*	55 31	2 46	550	...	..	...	...	...	...
Edinburgh (Royal Observy.)	*Midlothian*	55 55	3 11	442	76·3	10	36·7	3	0	0
Girvan (Pinmore)	*Ayr*	55 10	4 49	207	76·0	28	30·0	4	...	...
Glasgow (Queen's Park)	*Renfrew*	55 53	4 18	144	70·0	10	36·0	2	0	5
Tighnabruaich	*Argyll*	55 55	5 14	50	60·0	10†	34·0	2	0	...
Mull (Quinish)	,,	56 36	6 13	35	74·0	9	...	...	...	...
Dundee (Eastern Necropolis)	*Forfar*	56 28	2 57	199	76·2	10	33·0	4	0	...
Braemar	*Aberdeen*	57 0	3 24	1114	...	...	...	...	...	...
Aberdeen (Cranford)	,,	57 8	2 7	120	77·0	10, 19	28·0	3	1	1
Cawdor	*Nairn*	57 31	3 57	250	...	...	...	...	...	...
Invergarry	*E. Inverness*	57 4	4 47	13c?	...	...	...	...	...	...
Loch Torridon (Bendamph)	*W. Ross*	57 32	5 32	20	...	...	...	...	...	...
Dunrobin Castle	*Sutherland*	57 59	3 56	14	68·0	10	36·0	3	0	...
Castletown	*Caithness*	58 35	3 23	100	77·0	10	27·0	21	1	1
Killarney (District Asylum)	*Kerry*	52 4	9 31	178	74·5	22	42·5	4	0	...
Waterford (Brook Lodge)	*Waterford*	52 15	7 7	104	71·5	21	35·0	4	0	...
Broadford (Hurdlestown)	*Clare*	52 48	8 38	167	70·0	8	36·0	3	0	...
Abbey Leix (Blandsfort)	*Queen's County*	52 56	7 17	532	71·0	9	32·0	3	1	3
Dublin (Fitz William Square)	*Dublin*	53 21	6 14	54	71·2	10	38·7	4	0	0
Ballinasloe	*Galway*	53 20	8 15	160	...	...	...	...	...	...
Clifden (Kylemore House)	,,	53 32	9 52	105	...	...	...	...	...	...
Crossmolina (Enniscoe)	*Mayo*	54 4	9 18	74	...	...	...	...	...	...
Seaforde	*Down*	54 19	5 50	180	70·0	20	38·0	3	0	1
Londonderry (Creggan Res.)	*Londonderry*	54 59	7 19	320	...	...	...	...	...	...
Omagh (Edenfel)	*Tyrone*	54 36	7 18	280	...	...	...	...	...	...

† and 20, 26, 27, 28.

RAINFALL FOR SEPTEMBER, 1907.

RAINFALL OF MONTH.							RAINFALL FROM JAN. 1.					
Aver. 1870-99.	1907.	Diff. from Av.	% of Av.	Max. in 24 hours.		No. of Days	Aver. 1870-99.	1907.	Diff. from Aver.	% of Av	Mean Annual 1870-1899.	STATION.
in.	in.	in.		in.	Date.		in.	in.	in.		in.	
2·29	·62	—1·67	27	·16	4	8	17·74	14·56	— 3·18	82	25·16	Camden Square
2·62	·42	—2·20	16	·14	3, 4	6	18·80	13·71	— 5·11	73	28·36	Tenterden
2·58	·46	—2·12	18	·11	3	6	20·41	14·45	— 5·96	71	29·93	West Dean
2·38	·61	—1·77	26	·25	3	6	18·44	16·20	— 2·24	88	27·10	Hartley Wintney
2·26	·69	—1·57	31	·22	2	9	17·33	15·28	— 2·05	88	24·66	Hitchin
2·38	·90	—1·48	38	·50	2	6	18·96	15·74	— 3·22	83	26·75	Addington
2·49	·52	—1·97	21	·20	4	7	18·12	16·76	— 1·36	92	25·39	Westley
2·57	·43	—2·14	17	·14	4	5	17·58	16·43	— 1·15	94	25·40	Brundall
3·40	1·00	—2·40	30	·42	4	7	25·72	18·90	— 6·82	73	39·00	Winterbourne Stpltn
3·05	·94	—2·11	31	·48	26	9	23·74	16·84	— 6·90	71	35·00	Torquay
3·63	1·11	—2·52	30	·44	26	11	25·20	20·20	— 5·00	80	38·85	Polapit Tamar
2·89	·49	—2·40	17	·18	2	4	21·71	19·63	— 2·08	90	30·75	Bath
2·72	·71	—2·01	26	·29	2	5	21·28	18·51	— 2·77	87	29·85	Stroud
2·74	·72	—2·02	26	·19	4	7	22·95	21·98	— ·97	96	33·04	Wolstaston
2·71	·68	—2·03	25	·21	4	7	20·79	18·43	— 2·36	89	29·21	Coventry
2·30	·58	—1·72	25	·18	4	8	16·75	13·74	— 3·01	82	23·30	Boston
2·18	·51	—1·67	23	·17	4	8	17·81	14·03	— 3·78	79	24·70	Hodsock Priory
2·32	·75	—1·57	32	·28	4	7	18·85	19·91	+ 1·06	106	26·18	Derby
4·38	1·49	—2·89	34	·58	4	12	29·61	33·37	+ 3·76	113	42·43	Bolton
2·53	·84	—1·69	33	·35	2, 4	5	19·36	17·39	— 1·97	90	26·96	Ribston Hall
5·13	1·07	—4·06	21	·57	4	5	42·00	42·65	+ ·65	101	60·96	Arncliffe Vic.
2·40	·70	—1·70	29	·37	4	7	18·95	16·02	— 2·93	85	27·02	Hull
2·36	·64	—1·72	27	·33	4	7	19·76	16·64	— 3·12	84	27·99	Newcastle
12·76	2·03	—10·73	16	·86	1	8	90·72	83·14	— 7·58	92	132·68	Seathwaite
4·08	·81	—3·27	20	·23	3	8	29·31	24·16	— 5·15	82	42·81	Cardiff
4·21	1·40	—2·81	33	·47	4	5	31·62	26·88	— 4·74	85	47·88	Haverfordwest
4·20	1·13	—3·07	27	·39	4	5	30 66	31·50	+ ·84	103	45·41	Gogerddan
2·92	·22	—2·70	8	·10	4	5	20·57	16·43	— 4·14	80	30·98	Llandudno
3·71	·73	—2·98	20	·38	1	3	29 86	31·36	+ 1 50	105	43·43	Cargen
2·77	...		...	...	...	...	23·33	...	...	...	33·04	Riddell House
...	1·30	...	...	·51	2	9	...	20·98	...	...	..	Edinburgh
4·44	1·72	—2·72	39	·40	4	17	32·90	...	...	...	48·87	Girvan
3·34	1·25	—2·09	37	·36	4	13	25·43	27·68	+ 2·25	109	35·80	Glasgow
5·53	3·53	—2·00	64	1·30	1	11	39·64	43·79	+ 4·15	110	57·90	Tighnabruaich
5·47	1·79	—3·68	33	·65	12	17	38·53	37·54	— ·99	97	57·53	Quinish
2·55	1·15	—1·40	45	·40	2	9	20·75	21·25	+ ·50	102	28·95	Dundee
3·27	·96	—2·31	29		...	...	24·93	21·76	— 3·17	87	36·07	Braemar
3·04	1·21	—1·83	40	·45	4	10	22·97	20·60	— 2·37	90	33·01	Aberdeen
3·01	·70	—2·31	23	17	1	7	21·34	22·09	+ ·75	104	29·37	Cawdor
5·12	2·20	—2·92	43	·48	6	8	37·81	43·13	+ 5·32	114	56·00	Invergarry
8·28	4·02	—4·26	48	1·01	6	16	57·69	68·98	+11·29	112	86·50	Bendamph
2·71	1·04	—1·67	38	·38	1	10	21·63	24·85	+ 3·22	115	31 60	Dunrobin Castle
...	·68	...	...	·19	1	15	...	23·11	...	...	..	Castletown
4·67	1·71	—2·96	37	·74	26	11	39·57	27·41	—12·16	69	58·11	Killarney
3·08	1·38	—1·70	45	·45	26	8	27·08	23·01	— 4·07	85	39·30	Waterford
2·94	1·73	—1·21	59	·48	4	16	23·79	23·84	+ ·05	100	33·47	Hurdlestown
2·86	1·27	—1·59	44	·29	3, 4	9	25·05	24 24	— ·81	97	35·19	Abbey Leix
2·15	·55	—1·60	26	·26	3	7	19·68	17·13	— 2·55	87	27·75	Dublin
3·17	...		...	...	...	...	26·36	..	...	...	37·04	Ballinasloe
6·72	3·29	—3·43	49	1·30	1	9	55·06	46·77	— 8·29	85	80·23	Kylemore House
4·12	1·81	—2·31	44	·52	1	17	34·02	34·14	+ ·12	100	50·50	Enniscoe
3·37	1·41	—1·96	42	·68	1	6	27·21	27·62	+ ·41	101	38·61	Seaforde
3·77	...	...	...	...	...	...	28·25	...	...	...	41·20	Londonderry
3·55	...	...	...	..	...	...	26·83	..	...	...	37·85	Omagh

SUPPLEMENTARY RAINFALL, SEPTEMBER, 1907.

Div.	STATION.	Rain inches.	Div.	STATION.	Rain. inches
II.	Abinger Hall	·87	XI.	Rhayader, Tyrmynydd	·91
,,	Ramsgate	·41	,,	Lake Vyrnwy	1·03
,,	Hailsham	·71	,,	Llangyhanfal, Plâs Draw	·69
,,	Crowborough, Uckfield Lodge	·95	,,	Criccieth, Talarvor	·53
,,	Totland Bay, Aston House	·93	,,	Llanberis, Pen-y-pass	2·05
,,	Emsworth, Redlands	·58	,,	Lligwy	53
,,	Alton, Ashdell	·61	,,	Douglas, Woodville	1·00
,,	Newbury, Welford Park	·81	XII.	Stoneykirk, Ardwell House	1·37
III.	Harrow Weald, Hill House.	·73	,,	Dalry, The Old Garroch	1·06
,,	Oxford, Magdalen College	·63	,,	Langholm, Drove Road	1·05
,,	Bloxham Grove	·80	,,	Moniaive, Maxwelton House	1·05
,,	Pitsford, Sedgebrook	·66	XIII.	N. Esk Reservoir [Penicuick]	1·45
,,	Huntingdon, Brampton	·71	XIV.	Maybole, Knockdon Farm	·80
,,	Wisbech, Bank House	·54	XV.	Campbeltown, Witchburn	1·65
IV.	Southend Water Works	·34	,,	Inveraray, Newtown	2·88
,,	Colchester, Lexden	·77	,,	Ballachulish House	3·15
,,	Newport, The Vicarage	·43	,,	Islay, Eallabus	2·61
,,	Rendlesham	·76	XVI.	Dollar Academy	2·02
,,	Swaffham	·57	,,	Loch Leven Sluice	1·33
,,	Blakeney	·62	,,	Balquhidder, Stronvar	1·91
V.	Bishops Cannings	·73	,,	Perth, Pitcullen House	·84
,,	Ashburton, Druid House	1·32	,,	Coupar Angus Station	·76
,,	Okehampton, Oaklands	1·02	,,	Blair Atholl	1·13
,,	Hartland Abbey	1·02	,,	Montrose, Sunnyside Asylum	1·05
,,	Lynmouth, Rock House	·84	XVII.	Alford, Lynturk Manse	1·16
,,	Probus, Lamellyn	2·25	,,	Keith Station	1·05
,,	Wellington, The Avenue	...	XVIII.	N. Uist, Lochmaddy	2·41
,,	North Cadbury Rectory	·65	,,	Alvey Manse	·86
VI.	Clifton, Pembroke Road	·62	,,	Loch Ness, Drumnadrochit.	·66
,,	Ross, The Graig	·57	,,	Glencarron Lodge	3·01
,,	Shifnal, Hatton Grange	1·24	,,	Fearn, Lower Pitkerrie	·75
,,	Cheadle, The Heath House.	..	XIX.	Invershin	·88
,,	Blockley, Upton Wold	·64	,,	Altnaharra	·93
,,	Worcester, Boughton Park.	·47	,,	Bettyhill	·81
VII.	Market Overton	1·86	XX.	Dunmanway, The Rectory	2·36
,,	Market Rasen	·51	,,	Cork	2·22
,,	Bawtry, Hesley Hall	·42	,,	Darrynane Abbey	2·20
VIII.	Neston, Hinderton Lodge	·45	,,	Glenam [Clonmel]	1·27
,,	Southport, Hesketh Park	·75	,,	Ballingarry, Gurteen	1·26
,,	Chatburn, Middlewood	1·17	,,	Miltown Malbay	3·16
,,	Cartmel, Flookburgh	·79	XXI.	Gorey, Courtown House	1·39
IX.	Langsett Moor, Up. Midhope	·78	,,	Moynalty, Westland	1·43
,,	Scarborough, Scalby	·53	,,	Athlone, Twyford	1·63
,,	Ingleby Greenhow	·57	,,	Mullingar, Belvedere	·86
,,	Mickleton	·29	XXII.	Woodlawn	1·64
X.	Bardon Mill, Beltingham	·41	,,	Westport, Murrisk Abbey	...
,,	Ewesley, Fallowlees	·37	,,	Collooney, Markree Obsy	1·76
,,	Ilderton, Lilburn Cottage	·38	,,	Mohill	1·87
,,	Keswick, York Bank	·56	XXIII.	Enniskillen, Portora	1·19
XI.	Llanfrechfa Grange	·92	,,	Warrenpoint, Summer Hill.	1·07
,,	Treherbert, Tyn-y-waun	2·32	,,	Banbridge, Milltown	·99
,,	Carmarthen, The Friary	·90	,,	Belfast, Springfield	1·37
,,	Castle Malgwyn [Llechryd].	·92	,,	Bushmills, Dundarave	1·55
,,	Plynlimon	1·60	,,	Stewartstown, The Square	·80
,,	Crickhowell, Ffordlas	1·20	,,	Killybegs	2·55
,,	New Radnor, Ednol	·88	,,	Horn Head	1·43

METEOROLOGICAL NOTES ON SEPTEMBER, 1907.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Temp. for Temperature; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; TS for Thunderstorm; R for Rain; H for Hail; S for Snow.

LONDON, CAMDEN SQUARE.—After the first week, which was somewhat unsettled, occurred the finest spell of the summer, with warm sunny days, and, except on 25th, no R from 7th to 29th. The mean temp. was 58°·5, or 0°·8 above the average. Duration of sunshine 143·9* hours, and of R 12·2 hours.

TENTERDEN.—Dry, warm, and genenally sunny after 6th. The R was the least since 1865. Duration of sunshine 197 † hours.

CROWBOROUGH.—Splendid weather from 7th, with considerable sunshine, and only ·12 in. of R. The total fall was 1·96 in. below the average of 36 years. Mean temp. 58°·5, or 1°·7 above the average.

BURY ST. EDMUNDS.—The most delightful month of the year, warm, with much sunshine, little wind, and 22 days in succession without R. Splendid harvest weather.

TORQUAY.—Duration of sunshine 172·0* hours, or 4·7 above the average. Mean temp. 59°·7, or 1°·4 above the average.

CLIFTON.—Fine and dry, with much sunshine, and absolute drought from 6th to 30th. The driest September since 1865.

BOLTON.—Duration of sunshine 84·4* hours, or 3·4 below the average, owing to frequent heavy mists. Mean temp. 55°·4, or 1°·4 above the average. No R fell from 5th to the end.

SOUTHPORT.—The driest September in 36 years' record, the fall being 2·45 in. below the average of 35 years. Duration of sunshine 128* hours, or 15 hours below the average, largely owing to haze; duration of R 12·3 hours.

CARMARTHEN.—Remarkably fine and bright, with abundant sunshine, and no R from 8th to 29th, inclusive. Partridges as a rule were scarce owing to the wet June, but pheasants seemed more promising. Corn and potatoes were well harvested.

HAVERFORDWEST.—No R from 7th to the end. Duration of sunshine 175·2* hours.

DOUGLAS.—The outlook at the beginning seemed hopeless, and the first five days were a prolongation of the lamentable weather of the previous three months, but there was a wonderful and quite unlooked for change on 6th, and from this date until 29th was an unbroken spell of magnificent weather, warm, sunny, calm, and very dry, to which gardens responded in a remarkable way.

DUMFRIES.—The R has been less in September twice only in 48 years, but although R was absent the weather was unfavourable for harvest operations, heavy dews and absence of wind preventing drying of stooks. Frost on 4th caused immense damage in gardens and to potatoes.

COUPAR ANGUS.—R 38 per cent. of the average, and mean temp. 53°·8, or 1°·7 above the average. The month opened with slight frosts, followed by calm and bright sunny days.

ABERDEEN.—Remarkably fine, bright and warm. The cereal crops which at the end of August were quite green ripened fast, and harvesting was general by the end of September.

DRUMNADROCHIT.—R 1·98 in., and rain days 6, below the average of 21 years. Unusually grand aurora on 10th.

BALLINGARRY.—A lovely month from 5th till 25th, with several hot days and no R. Harvest was begun and nearly finished in this period.

MILTOWN MALBAY.—Heavy R in the first and last weeks, but the middle was fair for harvesting, and the temp. was high throughout.

DUBLIN.—Opening with a broken and rainy spell the month proved fine, warm and genial, with absolute drought from 15th. Mean temp. 57°·8, or 1°·9 above the average of 35 years.

MARKREE.—With the exception of the first week, which was very wet, it was unusually fine, dry and mild. The duration of sunshine was small owing to fog.

* Campbell-Stokes. † Jordan.

Climatological Table for the British Empire, April, 1907.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp.	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Average. Dew Point.	Average. Humidity. 0-100	Absolute. Max. in Sun.	Absolute. Max. on Grass.	Total Rain. Depth.	Total Rain. Days.	Aver. Cloud.
	°		°		°	°	°		°	°	inches		
London, Camden Square	73·4	24	30·8	19	56·2	40·0	41·1	81	120·7	27·6	3·22	18	...
Malta	75·2	28	49·8	6	62·0	53·3	49·2	74	139·2	...	1·29	8	5·0
Lagos	91·0	30	71·0	1	87·8	76·6	75·2	75	161·0	70·0	6·07	9	7·7
Cape Town	84·4	3	48·4	20	71·2	55·2	53·2	73	—	—	1·94	8	5·2
Durban, Natal ...	84·2	28	57·6	23, 26	77·4	62·2	...	...	143·2	...	9·39	19	5·0
Johannesburg	72·6	9	43·2	26	64·6	49·3	50·4	84	149·9	37·5	2·91	12	4·5
Mauritius	84·4	15	61·8	29	81·5	69·9	68·5	80	144·3	55·0	8·51	17	6·9
Calcutta...	103·3	25	67·2	2	93·4	73·9	70·3	69	157·7	61·2	1·25	5	5·3
Bombay...	92·5	2	76·0	4	89·7	78·6	72·6	71	141·0	69·9	·06	3	4·2
Madras	97·4	30	71·6	12	92·4	76·6	74·4	78	147·0	69·6	·12	2	3·4
Kodaikanal	72·4	24	48·1	4	67·3	52·2	50·4	77	141·4	37·2	6·26	16	5·4
Colombo, Ceylon ...	91·4	9	71·4	10	89·5	75·4	73·4	75	155·8	69·8	6·16	16	4·6
Hongkong	81·7	13	53·9	1	72·9	65·7	64·8	84	136·7	...	11·76	16	8·6
Melbourne	90·0	4	43·0	3	65·8	50·6	46·5	69	141·1	32·0	2·38	14	7·7
Adelaide	92·4	4	45·0	17	69·8	52·5	48·9	66	142·0	37·8	2 26	16	6·1
Coolgardie	96·2	3	45·0	18, 28	75·8	54·0	43·1	51	164·3	39·0	·00	0	1·8
Sydney	81·9	2	49·1	27	72·0	57·0	52·4	71·4	116·9	39·2	1·50	15	3·6
Wellington	72·5	16	42·4	30	63·5	53·3	50·5	76	118·0	34·0	2·73	16	6·7
Auckland	75·0	9	45·0	30	69·3	57·3	54·6	74	130·0	41·0	2·94	13	5·3
Jamaica, Negril Point.	88·2	16	65·2	4	84·2	69·8	67·6	71	...	...	1·29	6	...
Trinidad	93·0	21	65·0	several	88·1	68·3	70·8	79	159·0	60·0	·09	1	...
Grenada	86·8	12	71·0	9	85·0	73·4	66·4	65	149·2	...	1·29	10	3·3
Toronto	70·0	29	17·6	2	..	...	...	...	...	...	2·09	11	0·6
Fredericton	68·0	30	11·0	8	...	...	...	66	...	...	4·89	8	0·6
St. John's, N.B. ...	52·3	28	13·5	7	...	...	...	...	...	...	4·51	16	0·7
Victoria, B.C.	67·2	21	32·2	28	...	...	...	...	...	...	1·39	8	0·5
Dawson	61·0	27	-29·5	1	...	...	...	..	...	...	·23	8	0·4

MALTA.—Mean temp. of air 58°·2. Mean hourly velocity of wind 12·4 miles.

Natal.—Rainfall 6·50 in. above the average and the heaviest fall in the month of April for 34 years.

Johannesburg.—Bright sunshine 195·6 hours, or 57 per cent. of the possible amount.

Mauritius.—Mean temp. of air equal to, dew point 0°·3, and relative humidity 1·2 per cent. below, and R 3·50 in. above, averages.

MADRAS.—Bright sunshine 255·3 hours. TS8 on 2 days.

KODAIKANAL.—Bright sunshine 201 hours.

COLOMBO.—Mean temp. of air 82°·3 or 0°·3 below, of dew point 1°·1 below, and R 4·50 in. below, averages. Mean hourly velocity of wind 5·6 miles per hour.

HONGKONG.—Mean temp. of air 69°·2. Bright sunshine 78·3 hours. R 6·2 in. above, and sunshine 30·8 hours below, averages. Mean hourly velocity of wind 13·5 miles.

Adelaide.—Mean temp. of air 2°·9 below, and R ·41 in. above, averages.

Sydney.—Mean temp. of air 0°·1 below, and R 3·95 in. below, averages.

Wellington.—Mean temp. of air 1°·8 above, and R ·04 in. below averages. Bright sunshine 153·6 hours.

TRINIDAD.—R 2·03 in. below 43 years' average.

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HYGROSCOPES.

By John Aitken, LL.D., F.R.S.

In recent numbers of your Magazine you have described and illustrated some hygroscopes. The one described in your number for February last is an ingenious method of using our old friend the

awn of the sterile oat, the twisting and untwisting of which is made to alter the position of the wings of an artificial butterfly. This awn was long ago used for making some of the hygroscopes which were fitted into the lower part of old-fashioned wheel barometers, where, of course, they were utterly useless, owing to being closely confined in the hollow in the frame cut out for them and covered with glass, and therefore cut off from all communication with the outer air. Besides this awn there are many other organic substances capable of indicating a change in the humidity of the atmosphere. One of these, which I have never seen referred to anywhere, and which I have used for many years and found very sensitive—much more so than the awn of the sterile oat—it is made of a petal of one of the so-called everlasting flowers. Though the petals of any of these flowers can be used, yet I think those of *Acroclinium roseum*, or *album*, will be found to be the most suitable.

In the lower part of the illustration is shown an instrument which has been used for many years. At the top left-hand corner is shown a flower of *Acroclinium*, and at the top right corner are three petals taken from another flower; two of these are shown edge-on, the third broadside. The petal to the left is fairly dry, while the middle one is not so dry, and if it had been in saturated air there would have been no break in the curvature; the upper and lower parts of the petal would have formed a continuous curve, the upper part coming to nearly a horizontal position. The curious point in this mechanism is that the sensitive area is extremely short, and forms practically an elbow joint, the upper part of the petal hinging on the lower part, which is fixed in the top of the flower stalk. By this mechanism the flower is enabled to open and close its petals with every change in the humidity of the atmosphere.

In the instrument shown in the lower part of the illustration a short pillar is screwed into the base-plate near the centre, and to this is attached a spring clip as shown. A petal having been selected from a flower, most of it is cut away above the sensitive part and a stiff hair cemented in its place to act as a pointer, and what was the base of the petal is inserted into the clip. The instrument is then put under a glass cover, which has been wetted inside to saturate the air. After the pointer ceases to move the centre pillar is turned so as to bring the pointer to zero on the scale.

This instrument is just about as sensitive as a hair hygroscope, and has advantages over it. It is much more compact, has no mechanism to get out of order or to cause friction, and is much cheaper. The instrument should be fitted in an open metal-work case, or the cover must be opened when in use if not fully ventilated. Nothing but metal should be used in the construction of the case. For the scale, paper should be avoided, owing to its power of absorbing and giving out moisture, which retards the movements of the hygroscope.

THE RAINFALL OF OCTOBER, 1907.

A WET October is no new thing, for in the British Isles that month has on the average the heaviest general rainfall of the twelve; but, probably in contrast with the remarkable dryness of September, the wetness of October, 1907, has acquired a certain notoriety which will, we think, be short-lived. Our correspondence pages bear witness to the very heavy falls of rain which occurred in various parts of the country on the 16th, accompanying the passage of a deep depression from south to north, and but for that day and the 28th the rainfall of October would hardly have exceeded the average in most parts of the country.

The tables at the end of this number give details of the actual rainfall at a large number of stations, and the returns from four times as many are utilized in producing the accompanying map of the October rainfall. It will be observed that the north of Scotland is remarkably dry, indeed the whole country north of the Great Glen had less than the average, and in some parts less than half the average. There was a relatively dry belt stretching southward and eastward from Lancashire, where the rainfall was below the average at some points; and in London and its immediate neighbourhood, to the north-east, the rainfall also failed to reach the average.

On the other hand the south and east of Scotland, the greater part of England, and the south and east of Ireland, had an excess of more than fifty per cent. of rain, and there were two extensive areas—in the south of Scotland and in the south of England respectively—where more than twice the average rainfall for the month was precipitated. In those areas the fall was, in some instances, unprecedentedly great in records extending over more than thirty years.

The map now reproduced may be compared with that of the extraordinarily wet October of 1903 (Vol. **38**, p. 170), which was probably the wettest on record for the country as a whole, and although a few stations had more rain in October, 1907, than in October, 1903, the country as a whole had greatly less. Last month only a few patches with more than 10 inches of rain occurred as compared with large areas in 1903, and the areas over 8 and over 6 inches were also restricted, though the latter were sufficiently extensive to be remarkable in the South of England and over the Pennine Chain. In the South of Scotland the October rainfall approaches more nearly to that of 1903 than in any other part of the country. Unfortunately several of the records available four years ago have come to an end, but we can compare a certain number.

It is apparent from the table that while in the west of Scotland the rainfall of October, 1903, was several inches greater than that of 1907, the relation is reversed in the Lothians, where the rainfall of last month exceeded that of October, 1903, by between one and two inches, and is, we believe, the greatest that has been recorded in the Edinburgh district since observations began.

RAINFALL OF OCTOBER, 1907.

		Rainfall of October, 1903.	1907.	Oct., 1903, Wetter by	Oct., 1907, Wetter by
		in.	in.	in.	in.
XII.	Cargen [Dumfries].....	10·40	8·59	1·81	
,,	Dalry, Old Garroch	12·34	10·08	2·26	
,,	Langholm	11·85	7·34	4·51	
,,	Moniaive, Maxwelton House	11·59	9·14	2·49	
XIII.	Selkirk, The Hangingshaw...	10·12	6·42	3·70	
,,	Edinburgh, Roy. Observatory	5·72	7·90	...	2·18
,,	West Linton, Rutherford Ho.	8·11	8·97	...	·86
,,	N. Esk Reservoir [Penicuick]	7·90	9·00	...	1·10
,,	Whittinghame Gardens	7·09	9·08	...	1·99
,,	Boghead	8·54	9·81	...	1·27
XIV.	Colmonell	9·01	6·91	2·10	
,,	Glasgow, Queen's Park	7·47	6·66	·81	
XV.	Tighnabruaich	10·61	7·31	3·30	
XVI.	Loch Leven Sluice.....	7·55	6·77	·78	
,,	Dundee, Eastern Necropolis..	5.30	5·20	·10	
,,	Balquhidder, Stronvar..	15·58	5.67	9·91	

The effect of the heavy rain on the harvest in Scotland has been disastrous, the splendid crops, which at the end of September were almost ready for cutting, having been totally lost in many parts of the country.

The dull cold summer, with many rain days, followed by this wet October, have created a general impression that 1907 has so far proved a very wet year. The data before us are not complete, but we think that there is good ground for the statement, based on the records published in our pages, that although the rainfall for the ten months in Scotland exceeds the average by about 7 per cent., in Ireland it just reaches the average, and in England and Wales it falls short of the average by something like 4 per cent. It thus depends on the rain of November and December whether the year will have to be recorded as wet or dry.

ON A REPRESENTATION OF THE TEMPERATURE CYCLE OF THE SEASONS.

By L. C. W. Bonacina, F.R.Met.Soc.

The following investigation may serve to elucidate the nature and peculiarities of that cycle of atmospheric temperature changes which differentiate the seasons. There need to be considered only two agencies which control the temperature of the Earth's atmosphere as a whole: (*a*) the reservoir of heat or furnace, (*b*) the receiver of heat or refrigerator. The reservoir of heat for the atmosphere is, of course, the sun; the refrigerator of the atmosphere is properly the land and water surface of the globe, for although it is this surface which communicates to the lower layers of the atmosphere most of the heat which the latter derives from the sun, it is likewise this very surface which is always ready to act as a source of cold by radiating back into space the energy received from the reservoir.

These two agencies, then, are in constant antagonism, and operate through the transmission in opposite directions of radiant energy. How they produce the characteristic effects in the four seasons will now be shown. Let only one hemisphere, say the northern, be considered. During the winter season, which for the present investigation is best defined as lying between the winter solstice about December 22nd and the vernal equinox about March 20th, the reservoir is transmitting only a small quantity, relatively speaking, of heat, so that so far as the northern hemisphere is concerned the temperature of the reservoir may be regarded as low, although constantly increasing throughout the period.

At the same time the refrigerator is at a lower temperature than in any other season, and inasmuch as the amounts of heat gained and lost by it during this epoch are approximately equal, the atmosphere may be regarded in this relation as being in a state of low temperature equilibrium, the months of January and February being the coldest of the year. From March 20th to June 21st—that is to say, during the spring season—the reservoir furnishes as much heat as it does during the following summer season, and its temperature may therefore be regarded as high and as increasing till the end of the period at the summer solstice when it reaches its maximum. The refrigerator is at a low temperature at the commencement of the period (March 20th), and gradually gaining more heat than it loses, has, by the advent of the summer solstice acquired a relatively high temperature. Further, the temperature conditions of the lower atmosphere in spring, being the product of the action of strong solar radiation upon a cold land or water surface, are markedly unstable.

In the period from about June 21st to September 23rd, which constitutes the summer season, the reservoir is at a high but constantly declining temperature; the refrigerator is likewise, as compared with winter, at a high temperature, and since it loses approximately as much heat as it gains, the lower atmosphere is now at a high temperature equilibrium, July and August being the warmest months of the year.

In autumn, which lasts from about September 23rd to about December 22nd, the reservoir is still diminishing the output of heat, its temperature reaching a minimum at the winter solstice, whilst a steady leakage of heat takes place from the refrigerator, which begins warm and ends cold. The cooling of the refrigerator must, of course, be communicated to the lower atmosphere, but the latter does not in autumn, for a reason to be shortly indicated, exhibit the temperature instability so conspicuous in spring.

The following tabulation affords an insight into the reason of two interesting peculiarities by which the normal temperature cycle of the seasons is characterised. These are: (1) the large daily range of atmospheric temperature in summer as compared with winter; (2) the different manner in which the atmosphere becomes heated and cooled in spring and autumn respectively.

	Reservoir of Heat (furnace), *i.e.*, the Sun.	Receiver of Heat (refrigerator), *i.e.*, the land and water surface of the globe.	Atmosphere of the Earth.
WINTER (Dec. 22–Mar. 20)	Amount of heat transmitted small; increasing	Loss and gain of heat equal	Low temperature equilibrium
SPRING (Mar. 20–June 21)	,, ,, ,, large; increasing	Gain greater than loss	Temp. rises irregularly
SUMMER (June 21–Sep. 23)	,, ,, ,, large; decreasing	Loss and gain equal	High temperature equilibrium
AUTUMN (Sep. 23–Dec. 22)	,, ,, ,, small; decreasing	Loss greater than gain	Temp. falls more regularly than it rises in spring

As to (1), the greater difference shown by meteorological records between the mean temperatures of day and night in summer than in winter follows on the principle of Newton's *law of cooling*, as a little reflection will suggest. The case of (2) deserves more consideration as it is less easily accounted for. Soon after the vernal equinox solar radiation becomes powerful and of long daily duration, and soon after the autumnal equinox it becomes feeble and of short daily duration; but the receiving surface of the northern hemisphere—*i.e.*, the refrigerator of the lower atmosphere—is cold at the former date and warm at the latter, having the summer surplus of heat to get rid of in the form of dark radiant energy. There is, consequently, a much greater difference in April and May than in October and November between the amounts of heat already possessed by the refrigerator and the amounts in the form of solar radiant energy to which it is exposed.

The period from March to June, proverbially treacherous in its meteorological character, is normally marked in most temperate countries by a series of sudden spurts of high temperature frequently followed by a speedy relapse into the cold of winter. In other words, this irregular and capricious mode of arrival of summer warmth is due to the difficulty experienced by the powerful solar radiation of April and May in defeating the tendency of the refrigerator to retain in the atmosphere the low-level temperature of winter. In October and November, on the contrary, when the sun's rays are feeble, and the office of the refrigerator is to cool the atmosphere by parting with its own summer store of heat, the onslaught of the cold of winter is, except in so far as it may be interfered with by general meteorological causes or particular types of weather, much more regular and gradual, and a steady leakage of heat marks the recession of the vertical sun into the southern hemisphere. This exposition is a general representation of the temperature cycle of the seasons for the globe as a whole, without reference to the distinctive characteristics or anomalies of the cycle over any particular region.

Correspondence.

To the Editor of Symons's Meteorological Magazine.

THE COLD SNAP IN SCOTLAND ON OCTOBER 8th.

THE sudden access of low temperature over Scotland on October 8th, 1907, was a highly instructive phenomenon from the meteorological point of view. The Weather Chart of the Deutsche Seewarte showed that on that morning there was no frost in any other part of Europe, not even in the most northerly regions, including Iceland, Lapland, and northern Russia. At Wick, a temperature of —2·26° C. (27° F.)* was recorded, at Stornoway —0·6° C. (31° F.), whilst at Aberdeen the temperature was +1·1° C. (33° F.). Along the whole east of England, even though the wind was westerly, the recorded temperatures were less than 3° C. (38° F.), and this at a time of year when the warming influence of the sea is still fully operative. The surrounding water was warm enough to influence the temperature of the air over the coasts affected by sea winds, as is shown by observations of 6·7° C. (44° F.) at Thorshavn, 7·8° C. (45° F.) at Valencia, 8·5° C. at Westervig, on the west of Denmark, and 8·2° C. at Oxö in the south of Norway.

Whence then came the cold snap in Scotland? The weather chart shows three areas of low pressure, as indicated by the isobar of 750 mm. (= 29·54 in.); one over Ireland, one over the North Sea, and one over the Norwegian Sea, which were drawing in the air from all sides. Scotland, however, lay under a little anticyclone, which might, perhaps, be represented by the isobar of 752·5 mm. (= 29·63 in.). In this way the air from the west of Scotland was being drawn over towards Ireland; that in the east of Scotland was being drawn south-eastward to the North Sea; and that over Orkney and Shetland north-eastward towards the Norwegian Sea. In order to take the place of this outdraught on all sides, it was necessary for the air in the little Scottish anticyclone to be replenished from above, and in Autumn the upper air is cold enough to produce a frost on the surface, in spite of the dynamical heating which it undergoes in its descent, the clear sky and dry upper air favouring nocturnal radiation.

Similar phenomena have occurred over the Cimbrian peninsula when cyclones lay simultaneously over the North Sea and the western Baltic, and air from above has descended to replace that drawn away to opposite sides; but I have never seen so striking an instance as that of October 8th in Scotland.

The Weather Chart of the Deutsche Seewarte for October 24th, at 8 a.m., supplies an *experimentum crucis* as to my theory of the frost of October 8th. This time there are two barometrical depressions,

* The temperatures in brackets are those recorded in the *Daily Weather Report* for October 8th, not the exact equivalents of the Centigrade temperatures.

one in the North Sea, the other in the Bristol Channel, and between them a region with a relatively strong descending current of cold air, from which comes a record of 32° F. and fog at Skegness.

The University, Kiel, October 25th, 1907. O. KRÜMMEL.

[The *Daily Weather Report* of our Meteorological Office does not show the low-pressure area over the North Sea on October 8th, though the low-pressures over Ireland and the Norwegian Sea are clearly brought out. It shows an area with less than 30° F. in the north-east of Scotland, while the isotherm of 40° includes the centre of Great Britain from north to south, and reappears in no other part of Europe except the middle of Ireland and Iceland. The *Daily Weather Report* of October 25th shows a low-pressure area over Ireland and another in the Norwegian Sea, but none in the North Sea; temperatures under 40° are indicated both in the east of Scotland and the east of England, elsewhere only in Iceland and northern Scandinavia. It must be remembered that the isobars on these charts are drawn from a very small number of points, and it often happens that when drawn for different units, *e.g.*, one set for intervals of 5 mm. another for intervals of 0·1 in., the same data may not give exactly the same outlines. Professor Krümmel's theory is in our opinion supported as well by the British chart as by the German chart which suggested it.—ED. *S.M.M.*]

HEAVY RAIN OF OCTOBER 16th—17th.

IN case you should be investigating the rainfall of October 16th–17th, I send you my figures.

Rain began about 7 p.m. on October 16th, and ended about noon on the 17th; very little fell before 9 p.m. or after 11 a.m., the heaviest was probably between 5 and 6 a.m.

	7 p.m. to 9 a.m.	9 a.m. to noon.	
Harewood Lodge	2·15	0·50	=2·65 in.
Royd Edge	2·13	0·69	=2·82 in.

The fall of 2·65 in. in 17 hours (most of it in 14 hours) has, I think, only been exceeded once in my register, *viz.*, in 1901, 3·06 in. in 16 hours, from November 11th, 8.30 p.m., to November 12th, 12.30 p.m.

Other heavy falls, not of thunderstorm type, are:—1883, January 28th, 10.30 a.m., to 29th, 10.30 a.m., 2·35 inches, which owing to the then position of the gauge is too small and requires an addition of from 10 to 15 per cent.; 1890, November 22nd–23rd, 36 hours, 2·43 in.; 1892, October 14th, 4 a.m., to 15th, 10 p.m., continuous rain 42 hours, 4·00 inches, of which 2·31 in. in 24 hours ending 15th at 9 a.m.; 1907, October 16th, 7 p.m., to 17th, 12 noon, 2·65 inches in 17 hours.

CHARLES L. BROOK.

Harewood Lodge, Meltham, Yorks, Oct. 19th, 1907.

THE rainfall for the 24 hours ending at 9.30 this morning was 3·67 in., which is nearly four times as much as the previous heaviest fall this year, *viz.*, ·93 in. on 20th April. My position is about 356 feet above sea level.

CHARLES F. SELBY.

Ravensbourne, Stoke Fleming, Nr. Dartmouth, 17th Oct., 1907.

THE rainfall registered here about 8.30 a.m. yesterday, the 17th October, was 3·41 inches. In my return to you at the end of the year this will appear as on the 16th October. My previous highest record was 1·65 inches on the 16th October, 1898.

A gale is now blowing with heavy rain, 11 a.m.

LEWIS KARSLAKE.

Redlap House, Nr. Dartmouth, 18th Oct., 1907.

I AM told that the rainfall in this neighbourhood in the 24 hours between 9 a.m. on Wednesday, October 16th, and 9 a.m. on Thursday, October 17th, was very unusual, and that we ought to report it to you. At "Fallapit" (Lord Ashcombe's place), East Allington, the rain gauge registered **4·63** during that 24 hours, and at Kingsbridge, 4½ miles off, where Mr. Latham, solicitor and architect, keeps a register also, it was **4·86**. At Salcombe it was only 2·30, and the same at Torquay.

A. D. MALLOCK.

East Allington Rectory, S.O., S. Devon, Nov. 2nd.

It MAY interest you to know that the rainfall here during the last 24 hours is **4·86** inches, at an elevation of 100 feet above sea level. I believe that the greatest amount previously recorded here during the last 40 years was 2·10 in. in any 24 hours.

T. W. LATHAM.

Westcombe, Kingsbridge, S. Devon, Oct. 17th, 1907.

THE GREENWICH SUMMER OF 1907.

A FEW notes on this may be acceptable. It might be described as decidedly cool and moderately dry. All the three months were cool; and on 69 of the 92 days (25 in June, 26 in July and 18 in August) the thermometer never got above the seventies; though it did once in May, and once in September. Few years have had so few of those hot days: we find 2 (each) in '41 and '53, one in '62 and '79, none in '60.

Some months ago I noted (in a contemporary) that where, as this year, the first three months were dry, the summer was generally dry (10 cases out of 12). The recent summer conforms to this.

The combination—a cool and dry summer—is rather rare, but less rare than that other, a warm and wet summer. On analysis of the records, 1841–1906, I find this:

1. Warm and dry summers 28
2. Cool and wet summers 21
3. Cool and dry summers 11
4. Warm and wet summers 5

(this leaves one case of average temperature). The third kind are thus one in 6; the fourth about one in 13.

Those cool and dry summers were: 1844, '54, '62, '63, '64, '69, '82, '83, '85, '86, '89 (thus, mostly in the sixties and eighties).

The warm and wet summers were: '52, '65, '73, '78, 1905. Curiously, these were all of the same type, *viz.*, June and August wet, July dry.

ALEX. B. MACDOWALL.

THE BROCKEN GHOST.

THE Brocken Ghost may often be seen on damp evenings such as November brings. When the night air is laden with mist anyone who will stand at the open window, having placed a candle behind him, will see a huge dim shadow thrown out upon the mist—and very weird the effect often is. A. F.

HAILSTONES.

ON October 11th, between 2 p.m. and 2.30 p.m., a sharp thunderstorm passed over this neighbourhood from S.W. to N.E., being accompanied by a heavy fall of hail lasting five minutes, from 2.5 p.m. to 2.10 p.m. The hailstones, although not of exceptional size, were of distinct formations. In the less common form the stone was composed of dull ice except at one side, where a small portion was clear. One base was markedly larger than the other.

In the other form there was a hard nucleus of dull ice surrounded by a radiated structure. This, again, was enclosed by rings of clear ice with a thin division between them, the edge was sharp and pointed although somewhat brittle. Some idea of the durability of the hailstones is brought out by the fact that five hours after the storm they were still to be found in sheltered spots, despite the fact that there was no material depression of temperature.

Fork-lightning of a deep blue hue was prevalent during the storm. From a number of observations I have obtained of thunderstorms accompanied by hail, it is a somewhat remarkable feature that the phenomena when occurring together are in almost every case accompanied by lightning of which the predominent colour is blue.

SPENCER C. RUSSELL.

Parkside, Ashley Road, Epsom, October 31st, 1907.

THE STUDY OF WEATHER PHENOMENA.*

By Rev. D. C. Bates, F.R.G.S., F.R.Met.Soc.

(*Continued from p. 177.*)

The *Temperature* of the air is the first subject we must deal with, and this in its most elementary form is as the senses perceive it. Heat is hard enough to define and explain, but even the most heedless youngster—the boy who on a wintry day neglects his overcoat, or the girl who forgets to put on her warm woollen undergarments —can usually tell you with some degree of definiteness the state of the air with regard to temperature and associate changes with times and events. In making a brief record first on the board, which one or more of the pupils may copy into a book, the teacher will draw out all sorts of information bearing on the subject. Every child will brighten up with associations and contradictions which the teacher will have to explain, guide or rule out of order. But to get them to understand, observe, remember and classify temperatures is the primary object in view.

Wind Directions and Velocities must have next attention. Fix the points of the compass roughly by the sun at sunrise, noon or sunset, and, from the usual point of observation, fix upon distant objects or the direction of a road for the points of reference on days when the sun is behind the clouds. Then the winds may be tabulated according to the four cardinal points and the four others half-way between, thus :—N , N.E., E., S.E., S., S.W., W., N.W., are all we need. For *velocity*, take the definitions used in our daily Weather Reports,† or use figures 0 for calm and 1 to 7 for the strength of the wind.

L.	1.	Light, just moving leaves on the trees.
B.	2.	Breeze moving branches.
FB.	3.	Fresh breeze, swaying branches, blowing up dust.
MG.	4.	Moderate gale, blowing up twigs from ground, swaying whole trees.
G.	5.	Gale, breaking small branches, loosening bricks or chimneys.
W.	6.	Gale of exceptional force, doing tremendous damage.

Cloudiness may be studied in three ways :—(1) For amount of the sky covered at a definite time, which is usually 9 a.m., in tenths. 0 is a clear day, and 1 with a little cloud, 2 more, 5 half covered, and so on to 10, quite overcast. (2) A simpler notation dependent on the scale of tenths for the estimation of the cloudiness or weather is the use of four letters to describe it at a certain time, or even for a whole day, as :—

* A paper read to a gathering of teachers at the Training College, Wellington, N.Z., August 1st, 1907.

† The Weather Reports of New Zealand are referred to. In the British Isles every alternate value of the Beaufort scale might conveniently be used.—Ed. *S.M.M.*

B. For blue, less than $^3/_{10}$ cloudy.
F. For fair, from $^3/_{10}$ to $^7/_{10}$ cloudy.
C. For cloudy, over $^7/_{10}$ cloudy; and
R. For rain, when the sky is usually overcast.

(3) By a description of the clouds according to their main divisions :— The stratus, or level low-lying clouds; the cumulus, or heaped or humpy clouds; and the cirrus, or lofty, feathery clouds, built up of delicate threads of particles of ice. Changes from one type to another are most instructive, and each has its own story to tell. The cirrus often heralds wind and storm; the stratus of winter thickens for rain, and the cumulus gathers up after the storm or before the thunderstorm or southerly that clears the air.

These are infant studies; but we may proceed to further division and classification as the studies advance. The international classification may be used as in all observatories, or we may exercise a little freedom and make our own independent studies in the form, colour, height, changes, direction of movement, and difference of direction between upper and lower clouds. At all times associate your observations with the weather that has passed here but is probably still prevailing at a distance, and with the weather which the clouds tell you to expect in the near future. Science is organised with accurate knowledge; therefore, work in the main upon the same lines as others, by using, as far as possible, the same terms. Tabulation, association and speculation will then show you that similar results follow similar causes. From these we form for ourselves empirical rules concerning the relationships between the clouds and the weather. The best local forecasters, especially of rain and wind, often go by nothing else than the clouds and their movements. Fishermen, shepherds and others who only use the tables of their memories, often attain, by steps and methods they cannot even trace, wonderful accuracy in the forecast of weather. Scientific methods are surer and safer, and those who will take the trouble carefully to observe, note down, tabulate and associate the various changes will obtain valuable results, but patience and perseverence are needed.

Hyther is a brand new word coined by Mr. W. F. Tyler, who lives at Shanghai where the heat and moisture at times makes life most uncomfortable. He invented it to express the degree of comfort, or rather discomfort, caused by weather. A bare record of temperature does not give the fullest idea of climatic effects. Dry heat, as in Australia, is tolerable; dry cold is enjoyable, as in the Canadian winter; cold moisture gives raw weather, hot moisture gives muggy weather, and this combination of the two is the hardest to bear. Mr. Tyler takes 0 as a perfect day, and 10 as almost unbearable, and by the numbers between he estimates varying degrees of discomfort. Professor Dexter, of America, in his book on "Weather Influences," treated of the effect especially upon school children, endeavouring to

show the times when school children were careless, unruly, etc., in relation to weather. Now take temperature, humidity, cloudiness (that makes us sad), *sunshine* that makes the butterflies come out and the youngster play truant; wind (that makes our horses frisky and unruly), and lump these phases together and estimate our days 1, 2, 3, 4, 5, 6, let us hope none of you ever get beyond that as an estimate of the sum total of the collective of bad sensations, as the effect of the weather on the body and mind. I think it would make an interesting addition to our registers especially as we shall see later we can somewhat check the records by instrumental tests with the hygrometer.

A full juvenile or first grade record would include :—

Date.	Temp.	Wind.		Cloud.				Remarks.	Hyther.
		Dir.	Velocity.	Amount 0—10	Kind.	Movement. Lower.	Movement. Upper.		

The teacher could draw out the record and write it upon the board and then one of the pupils, the honorary clerk of the weather, make a record in a book using both sides of the note book, or, better still, let all the pupils copy it out and on Monday morning summarise the last week and write the story of the weather as briefly, accurately and comprehensively as possible. At the end of the month the whole could be summarised and shown statistically, graphically by diagram, or even by picture. Such work gives a simple grip of most valuable methods and is extremely valuable as a school exercise. But, though it is hardly necessary to say so, it must not all be attempted at once or weather observations would be very burdensome.

Every place has a different climate owing to many complex influences of different soils, aspects for sunshine, neighbouring woods or hills, exposure to prevailing winds, etc. The climate depends a great deal upon the conformation of the country, and great mistakes are often made for want of a little weather knowledge some people would call common sense. I know of costly hospitals, asylums, mansions, etc., in different countries built in places naturally disagreeable both to plant and animal life. Primitive people understood weather signs. The Maori of old times usually built his *whare* on the sunny side of a hill, in a situation both airy and dry, and it was sheltered from the cold blasts by the palisading of the *pa*. In ignorance our settlers have often ruthlessly destroyed trees that would have given much comfort around their homesteads, sometimes they never realise their loss of comfort, but, if they do, how long a time they have to wait for natural shelter to grow again.

Correlation of the different elements of weather bring most useful but neglected facts home to the mind. For example we may take wind and temperature and record them in this form :—

	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Total.	Percentage
Very hot Hot										
Warm ...										
Cold ..... Very cold										

Or we may correlate wind and sky weather thus :—

	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Total.	Percentage
B.										
F.										
O.										
R.										
Total										
%										

The teacher will then be in a position to explain how the winds take their characteristics from the regions they come from. Cold from the south, hot from the north.*

Squared paper and cross lined exercise books can be used for diagrams to show varying forces of wind, cloudiness, direction of wind, Hyther, etc.

There are many other directions in which the study of weather phenomena without instruments might profitably be pursued, but we must hasten to speak of meteorological instruments which should only aid, though they sometimes seem to supersede real thought. People are apt to be satisfied with mere statistics which may be quite misleading, and it is to be regretted that English meteorologists the world over have had to pursue such drudgery in producing figures that their brains have but little chance of occupation in drawing out the meanings by a proper use of statistics. Brain work for research and not machine work for the printer is most needed. Bearing this in mind we may regard meteorological instrumental results as an *aid* but never as the supreme end in meteorological work. They are simply invaluable—essential indeed to the advance of the science, but meteorological research must be much more than a mere compilation of statistics. Do not let your work stop at that dead level, but rather study and observe until you feel an earnest desire to take up some special line of study in weather phenomena.

My present object is not to deliver a popular lecture upon the

* Again we remind our readers that the author addresses teachers in the southern hemisphere.—ED. *S.M.M.*

science, or to give instruction in meteorology itself, but to direct you to methods of independent study and for the teaching of the subject in two grades—(1.) Preliminary, without the aid of instruments; and (2.) Elementary Studies, with the aid of instruments. Advanced meteorology with its most interesting relationships to other sciences and dependence upon them for solution of its fascinating problems hardly comes within our scope, but I trust some of you will in time pursue it.

The best method of teaching meteorology to the little ones is the old one of catechetical enquiry, leading them by degrees to independent recognition of definite facts, and the discovery of relationships which exist between weather phenomena and definite causes. This can never be done all in one lesson, one season, or one year. You must hasten slowly, and carefully lay the foundations, not too much of the same thing, lest the pupils become weary, and not so much variety that the way is lost. By varying the observations interest may be awakened and sustained through a course of simple studies up to a more complete and advanced knowledge,—in a word the lessons must have a living interest, and be progressively instructive.

METEOROLOGICAL NEWS AND NOTES.

THE SYMONS GOLD MEDAL for 1908 was awarded by the council of the Royal Meteorological Society, at their meeting on October 16th, to Monsieur L. Teisserenc de Bort, of Paris, in recognition of the services which he has rendered to the science of meteorology. The medal was established in memory of the late George James Symons, F.R.S., the founder of the British Rainfall Organization, and is awarded biennially. The presentation will take place at the annual general meeting of the society on January 15th.

AT THE METEOROLOGICAL OFFICE the Director resumed on October 28th the series of meetings commenced in 1905 for the informal discussion of important contributions to Meteorological Literature, particularly those by Colonial or Foreign Meteorologists. The days provisionally arranged for the meetings are the following Mondays (at 5 p.m.):—November 25th, December 9th, 1907; January 20th, February 3rd and 17th, March 2nd, 16th, and 30th, 1908. The Director will be glad if contributors of observations to the Office, and others interested in Meteorology, will favour him with their presence at 63, Victoria Street, S.W., and take part in the discussions.

DR. W. N. SHAW, F.R.S., Reader in Meteorology in the University of London, commenced a series of twelve lectures on Meteorological Organization and Methods of dealing with meteorological observations, on Monday, October 21st, and these are being con-

tinued on alternate Mondays, at the University of London, South Kensington. The lectures are designed for advanced students at the University and others interested in Meteorology. There is no fee for the course.

THE INTERNATIONAL METEOROLOGICAL COMMITTEE met at Paris on September 10th, ten out of the seventeen members being present. Dr. Shaw was appointed President in succession to M. Mascart, and Prof. Hellmann was appointed Secretary, in succession to Prof. Hildebrandsson. From a very brief report in *Nature* we learn that the principal subjects discussed were the scheme of organisation of international meetings for meteorological purposes; marine charts and weather signals; a number of items of the international daily weather service, including reports by wireless telegraphy; and various propositions concerning the meteorology of the globe, in which were included one on the necessity for observing stations in the regions of centres of action of the atmosphere, another on the necessity for new charts of isotherms for the globe, and a third on the desirability of daily observations from selected stations, in order to trace the course of meteorological changes over the globe.

DR. W. DOBERCK, the late Director of the Observatory at Hong Kong has been succeeded in that position by Mr. F. G. Figg, who has been connected with the Observatory for many years.

WEATHER WHIMS A HUNDRED YEARS AGO.

AMONGST the interesting extracts from *The Times* of a century ago, we note the following quaint paragraph from the issue of Friday, October 30th, 1807 :—

"A man at *Thorn* has announced a discovery made by him, of a *certain* method, by which he can procure a constancy of 'settled *pleasant, healthy*, and *fruitful weather*;' and he adds, that he hopes 'the *Great Nation* will attend to it.' This undoubtedly deserves attention. Such an experiment is certainly beyond that of Dr. Franklin and others, who made *lightning* by poking at the clouds; or those of a late writer, who proposes enormous *mills* and *machines* in this Country, 'only to *abate* the rigour of the seasons,' by the effect of their friction on the atmosphere; or that of Jacques Bernardin St. Pierre, who suggests the erection of *pyramids*, losing themselves in the skies, in countries where there are no mountains, to attract vapour, create clouds, and make showers of rain descend upon the plains beneath. It is suggested that we might as well buy up the secret, as let France get it, for we want it, both *at home* and in our *colonies*. 'Tis, however, rather an awkward circumstance for this sagacious Citizen, that he did not discover his *secret* while Napoleon was struggling, *in his neighbourhood*, with all the *rigours* of a *winter* climate, in his campaign against the Russians."

TEMPERATURE FOR OCTOBER, 1907.

STATION.	COUNTY.	Lat. N.	Long. W. [*E.]	Height above Sea. ft.	TEMPERATURE. Max.		TEMPERATURE. Min.		No. of Nights at or below 32°	
									Shade.	Grass.
		° ′	° ′		°	Date.	°	Date.		
Camden Square	*London*	51 32	0 8	111	68·2	1	37·1	24.26	0	0
Tenterden	*Kent*	51 4	*0 41	190	66·0	1	31·0	25	1	3
West Dean	*Hampshire*	51 3	1 38	137	63·0	1, 6	30·0	27	5	14
Hartley Wintney	,,	51 18	0 53	222	65·0	1, 2, 3	30·0	25	2	6
Hitchin	*Hertfordshire*	51 57	0 17	238	65·0	1	30·0	24	3	...
Winslow (Addington)	*Buckinghamshr.*	51 58	0 53	309	65·0	1	32·0	16, 24	2	4
Bury St. Edmunds (Westley)	*Suffolk*	52 15	*0 40	226	66·0	1	31·0	24	1	...
Brundall	*Norfolk*	52 37	*1 26	66	65·4	1	33·6	25	0	5
Winterbourne Steepleton	*Dorset*	50 42	2 31	316	62·0	1	30·2	25	1	6
Torquay (Cary Green)	*Devon*	50 28	3 32	12	65·9	4	38·8	27	0	0
Polapit Tamar [Launceston]	,,	50 40	4 22	315	61·5	4	31·8	16	1	5
Bath	*Somerset*	51 23	2 21	67	64·5	1	32·0	25	1	...
Stroud (Upfield)	*Gloucestershire*	51 44	2 13	226	65·0	1	38·0	24, 31	0	...
Church Stretton (Wolstaston)	*Shropshire*	52 35	2 48	800	64·0	7	...	...	...	...
Coventry (Kingswood)	*Warwickshire*	52 24	1 30	340	60·0	1	34·0	16	0	...
Boston	*Lincolnshire*	52 58	0 1	25	65·0	1	32·0	24	1	...
Worksop (Hodsock Priory)	*Nottinghamshire*	53 22	1 5	56	66·1	6	29·2	8	4	12
Derby (Midland Railway)	*Derbyshire*	52 55	1 28	156	66·0	1	31·0	15	4	...
Bolton (Queen's Park)	*Lancashire*	53 35	2 28	390	63·8	1	33·3	16	0	7
Wetherby (Ribston Hall)	*Yorkshire, W.R.*	53 59	1 24	130	...	...	...	...	...	...
Arncliffe Vicarage	,, ,,	54 8	2 6	732	...	...	...	...	...	...
Hull (Pearson Park)	,, *E.R.*	53 45	0 20	6	67·0	6	32·0	8	1	4
Newcastle (Town Moor)	*Northumberland*	54 59	1 38	201	...	...	...	...	...	...
Borrowdale (Seathwaite)	*Cumberland*	54 30	3 10	423	61·6	6	33·8	29	0	...
Cardiff (Ely)	*Glamorgan*	51 29	3 13	53	...	...	...	...	...	...
Haverfordwest (High Street)	*Pembroke*	51 48	4 58	95	60·2	6	33·0	24	0	2
Aberystwyth (Gogerddan)	*Cardigan*	52 26	4 1	83	70·0	1	27·0	15	...	...
Llandudno	*Carnarvon*	53 20	3 50	72	68·0	2	37·0	14	0	...
Cargen [Dumfries]	*Kirkcudbright*	55 2	3 37	80	62·0	4	31·0	27	1	...
Lilliesleaf (Riddell House)	*Roxburgh*	55 31	2 46	550	...	...	...	...	...	...
Edinburgh (Royal Observy.)	*Midlothian*	55 55	3 11	442	61·2	5	34·8	16	0	2
Girvan (Pinmore)	*Ayr*	55 10	4 49	207	61·0	9	27·0	27	3	...
Glasgow (Queen's Park)	*Renfrew*	55 53	4 18	144	60·0	1	32·0	26	1	13
Tighnabruaich	*Argyll*	55 55	5 14	50	56·0	1, 2	32·0	16, 26	2	2
Mull (Quinish)	,,	56 36	6 13	35	61·0	5	...	...	...	...
Dundee (Eastern Necropolis)	*Forfar*	56 28	2 57	199	59·2	6	31·2	8	1	...
Braemar	*Aberdeen*	57 0	3 24	1114	...	...	...	...	...	...
Aberdeen (Cranford)	,,	57 8	2 7	120	64·0	9	30·0	24	2	...
Cawdor	*Nairn*	57 31	3 57	250	...	...	...	...	...	...
Invergarry	*E. Inverness*	57 4	4 47	130?	...	...	...	...	...	...
Loch Torridon (Bendamph)	*W. Ross*	57 32	5 32	20	...	...	...	...	...	...
Dunrobin Castle	*Sutherland*	57 59	3 56	14	58·0	2	32·0	8	1	...
Castletown	*Caithness*	58 35	3 23	100	62·0	5	26·0	7	4	4
Killarney (District Asylum)	*Kerry*	52 4	9 31	178	65·0	2	31·0	16	...	...
Waterford (Brook Lodge)	*Waterford*	52 15	7 7	104	62·0	4	28·0	16	3	...
Broadford (Hurdlestown)	*Clare*	52 48	8 38	167	60·0	5, 6†	30·0	15, 23	2	...
Abbey Leix (Blandsfort)	*Queen's County*	52 56	7 17	532	62·0	5, 6	...	...	...	...
Dublin (Fitz William Square)	*Dublin*	53 21	6 14	54	65·1	5	32·8	24	0	2
Ballinasloe	*Galway*	53 20	8 15	160	66·0	20	29·0	27	5	...
Clifden (Kylemore House)	,,	53 32	9 52	105	...	...	...	...	...	...
Crossmolina (Enniscoe)	*Mayo*	54 4	9 18	74	...	...	...	...	...	...
Seaforde	*Down*	54 19	5 50	180	64·0	5	30·0	15	2	4
Londonderry (Creggan Res.)	*Londonderry*	54 59	7 19	320	...	...	...	...	...	...
Omagh (Edenfel)	*Tyrone*	54 36	7 18	280	...	...	...	...	...	...

† and 20.

RAINFALL FOR OCTOBER, 1907.

RAINFALL OF MONTH.							RAINFALL FROM JAN. 1.					
Aver. 1870-99.	1907.	Diff. from Av.	% of Av.	Max. in 24 hours.		No. of Days	Aver. 1870-99.	1907.	Diff. from Aver.	% of Av.	Mean Annual 1870-1899.	STATION.
in.	in.	in.		in.	Date.		in.	in.	in.		in.	
2·85	2·52	— ·33	88	·34	5	22	20·59	17·08	— 3·51	83	25·16	Camden Square
3·60	5·73	+2·13	159	·79	3	25	22·40	19·44	— 2·96	87	28·36	Tenterden
3·53	7·76	+4·23	215	1·13	10	25	23·94	22·21	— 1·73	93	29·93	West Dean
3·08	5·35	+2·27	174	·95	14	24	21·52	21·55	+ ·03	100	27·10	HartleyWintney
2·72	3·70	+ ·98	136	1·38	14	19	20·05	18·98	— 1·07	95	24·66	Hitchin
2·89	3·94	+1·05	127	·76	16	20	21·85	19·68	— 2·17	90	26·75	Addington
2·66	2·58	— ·08	97	·42	14	16	20·78	19·34	— 1·44	93	25·39	Westley
2·98	3·90	+ ·92	131	·86	9	24	20·56	20·33	— ·23	99	25·40	Brundall
4·33	10·12	+5·79	259	1·39	16	26	30·05	29·02	— 1·03	97	39·00	Winterbourne Stpltn
4·09	7·92	+3·83	193	1·91	16	27	27·83	24·76	— 3·07	89	35·00	Torquay
4·97	7·96	+2·99	160	1·26	16	28	30·17	28·16	— 2·01	93	38·85	Polapit Tamar
3·22	5·67	+2·45	176	·75	10	26	24·93	25·30	+ ·37	101	30·75	Bath
3·10	5·94	+2·84	191	1·15	16	24	24·38	24·45	+ ·07	100	29·85	Stroud
3·99	7·07	+3·08	177	1·68	16	24	26·94	29·05	+ 2·11	108	33·04	Wolstaston
3·18	5·03	+1·85	158	1·31	16	21	23·97	23·46	— ·51	98	29·21	Coventry
2·62	4·09	+1·47	156	1·04	6	21	19·37	17·83	— 1·54	92	23·30	Boston
2·77	5·35	+2·58	193	2·05	16	21	20·58	19·38	— 1·20	94	24·70	Hodsock Priory
2·77	3·79	+1·02	137	·96	16	24	21·62	23·70	+ 2·08	109	26·18	Derby
4·72	4·03	— ·69	85	·55	12	23	34·33	37·40	+ 3·07	109	42·43	Bolton
3·18	6·09	+2·91	191	1·01	16	23	22·54	23·48	+ ·94	104	26·96	Ribston Hall
6·55	7·02	+ ·47	107	1·09	16	22	48·55	49·67	+ 1·12	103	60·96	Arncliffe Vic.
3·26	3·96	+ ·70	121	·87	16	22	22·21	19·98	— 2·23	90	27·02	Hull
2·94	5·86	+2·92	199	·86	25	26	22·70	22·50	— ·20	99	27·99	Newcastle
3·35	15·11	+1·76	113	2·73	12	26	104·07	98·25	— 5·82	94	132·68	Seathwaite
4·81	7·33	+2·52	153	·88	8	30	34·12	31·49	— 2·63	92	42·81	Cardiff
5·63	8·80	+3·17	156	·89	30	31	37·25	35·68	— 1·57	96	47·88	Haverfordwest
5·58	6·56	+ ·98	118	1·13	21	24	36·24	38·06	+ 1·82	105	45·41	Gogerddan
4·08	5·28	+1·20	130	·59	30	25	24·65	21·71	— 2·94	88	30·98	Llandudno
4·39	8·59	+4·20	196	1·04	14	20	34·25	39·95	+ 5·70	117	43·43	Cargen
3·24	...	...	...	...	...	...	26·57	...	...	...	33·04	Riddell House
...	7·90	...	...	3·13	15	25	...	25·36	...	...	...	Edinburgh
5·42	8·49	+3·07	157	2·10	15	25	38·32	...	...	...	48·87	Girvan
3·36	6·66	+3·30	200	2·27	15	26	28·79	34·34	+ 5·55	119	35·80	Glasgow
5·72	7·31	+1·59	128	1·90	15	22	45·36	51·10	+ 5·74	113	57·90	Tighnabruaich
6·09	3·80	—2·29	62	·50	9	19	44·62	41·34	— 3 28	92	57·53	Quinish
2·71	5·20	+2·49	191	1·55	15	21	23·46	26·45	+ 2·99	113	28·95	Dundee
4·05	4·06	+ ·01	100	...	...	...	28·98	25·82	— 3·16	89	36·07	Braemar
3·18	6·01	+2·83	189	1·47	17	21	26·15	26·61	+ ·46	102	33·01	Aberdeen
2·85	5·04	+2·19	177	1·46	15	12	24·19	27·13	+ 2·94	112	29·37	Cawdor
5·54	3·21	—2·33	58	·85	16	14	43·35	46·34	+ 2·99	107	56·00	Invergarry
9·98	3·46	—6·52	35	·49	14	18	67·67	72·44	+ 4·77	109	86·50	Bendamph
3·32	2·01	—1·31	60	·35	9	14	24·95	26·86	+ 1·91	108	31·60	Dunrobin Castle
...	2·98	...	...	·87	15	25	...	26·09	...	...	...	Castletown
6·05	7·04	+ ·99	116	·71	1	30	45·62	34·45	—11·17	75	58·11	Killarney
4·00	6·12	+2·12	153	·85	27	27	31·08	29·13	— 1·95	94	39·30	Waterford
3·12	4·87	+1·75	156	·79	2	27	26·91	28·71	+ 1·80	107	33·47	Hurdlestown
3·45	5·89	+2·44	171	1·00	8	29	28·50	30·13	+ 1·63	106	35·19	Abbey Leix
3·08	5·12	+2·04	166	·71	8	29	22·76	22·25	— ·51	98	27·75	Dublin
3·45	4·31	+ ·86	125	·80	9	25	29·81	29·41	— ·40	99	37·04	Ballinasloe
7·93	11·26	+3·33	142	1·90	1	27	62·99	58·03	— 4·96	92	80·23	KylemoreHouse
5·04	6·60	+1·56	131	·85	18	29	39·06	40·74	+ 1·68	104	50·50	Enniscoe
3·82	5·55	+1·73	141	·63	20	23	31·03	33·17	+ 2·14	107	38·61	Seaforde
4·45	3·64	— ·81	82	·82	6	24	32·70	39·58	+ 6·88	121	41·20	Londonderry
3·72	...	...	...	...	...	...	30·55	...	...	...	37·85	Omagh

SUPPLEMENTARY RAINFALL, OCTOBER, 1907.

Div.	STATION.	Rain inches	Div.	STATION.	Rain. inches
II.	Abinger Hall	7·08	XI.	Rhayader, Tyrmynydd	5·80
,,	Ramsgate	4·69	,,	Lake Vyrnwy	8·30
,,	Hailsham	6·49	,,	Llangyhanfal, Plâs Draw	8·15
,,	Crowborough, Uckfield Lodge	6·36	,,	Criccieth, Talarvor	5·17
,,	Totland Bay, Aston House	7·07	,,	Llanberis, Pen-y-pass	16·82
,,	Emsworth, Redlands	6·82	,,	Lligwy	7·45
,,	Alton, Ashdell	6·72	,,	Douglas, Woodville	7·10
,,	Newbury, Welford Park	7·53	XII.	Stoneykirk, Ardwell House	6·54
III.	Harrow Weald, Hill House.	4·66	,,	Dalry, The Old Garroch	10·08
,,	Oxford, Magdalen College	5·18	,,	Langholm, Drove Road	7·34
,,	Bloxham Grove	5·39	,,	Moniaive, Maxwelton House	9·14
,,	Pitsford, Sedgebrook	4·66	XIII.	N. Esk Reservoir [Penicuick]	9·00
,,	Huntingdon, Brampton	3·43	XIV.	Maybole, Knockdon Farm	7·30
,,	Wisbech, Bank House	2·73	XV.	Campbeltown, Witchburn	6·21
IV.	Southend Water Works	3·05	,,	Inveraray, Newtown	4·15
,,	Colchester, Lexden	2·46	,,	Ballachulish House	4·63
,,	Newport, The Vicarage	2·48	,,	Islay, Eallabus	5·00
,,	Rendlesham	3·00	XVI.	Dollar Academy	7·10
,,	Swaffham	3·07	,,	Loch Leven Sluice	6·77
,,	Blakeney	4·10	,,	Balquhidder, Stronvar	5·67
V.	Bishops Cannings	5·81	,,	Perth, Pitcullen House	4·79
,,	Ashburton, Druid House	8·53	,,	Coupar Angus Station	4·80
,,	Okehampton, Oaklands	7·81	,,	Blair Atholl	2·75
,,	Hartland Abbey	5·71	,,	Montrose, Sunnyside Asylum	4·99
,,	Lynmouth, Rock House	5·92	XVII.	Alford, Lynturk Manse	5·58
,,	Probus, Lamellyn	8·02	,,	Keith Station	5·78
,,	Wellington, The Avenue	...	XVIII.	N. Uist, Lochmaddy	2·21
,,	North Cadbury Rectory	5·81	,,	Alvey Manse	3·52
VI.	Clifton, Pembroke Road	5·33	,,	Loch Ness, Drumnadrochit.	3·67
,,	Ross, The Graig	8·51	,,	Glencarron Lodge	3·85
,,	Shifnal, Hatton Grange	4·99	,,	Fearn, Lower Pitkerrie	2·23
,,	Cheadle, The Heath House.	...	XIX.	Invershin	1·97
,,	Blockley, Upton Wold	8·40	,,	Altnaharra	1·62
,,	Worcester, Boughton Park.	6·84	,,	Bettyhill	2·09
VII.	Market Overton	5·60	XX.	Dunmanway, The Rectory	6·43
,,	Market Rasen	4·47	,,	Cork	5·07
,,	Bawtry, Hesley Hall	4·55	,,	Darrynane Abbey	6·74
VIII.	Neston, Hinderton Lodge	3·90	,,	Glenam [Clonmel]	6·99
,,	Southport, Hesketh Park	3·80	,,	Ballingarry, Gurteen	4·87
,,	Chatburn, Middlewood	4·49	,,	Miltown Malbay	6·20
,,	Cartmel, Flookburgh	7·13	XXI.	Gorey, Courtown House	6·24
IX.	Langsett Moor, Up. Midhope	7·73	,,	Moynalty, Westland	5·74
,,	Scarborough, Scalby	4·02	,,	Athlone, Twyford	3·62
,,	Ingleby Greenhow	4·87	,,	Mullingar, Belvedere	4·86
,,	Mickleton	4·90	XXII.	Woodlawn	5·10
X.	Bardon Mill, Beltingham	6·52	,,	Westport, Murrisk Abbey	...
,,	Ewesley, Fallowlees	5·84	,,	Collooney, Markree Obsy.	5·08
,,	Ilderton, Lilburn Cottage	7·46	,,	Mohill	4·24
,,	Keswick, York Bank	8·06	XXIII.	Enniskillen, Portora	4·07
XI.	Llanfrechfa Grange	6·93	,,	Warrenpoint, Summer Hill.	4·71
,,	Treherbert, Tyn-y-waun	10·98	,,	Banbridge, Milltown	4·09
,,	Carmarthen, The Friary	9·40	,,	Belfast, Springfield	4·28
,,	Castle Malgwyn [Llechryd].	10·62	,,	Bushmills, Dundarave	4·26
,,	Plynlimon	11·40	,,	Stewartstown, The Square	3·87
,,	Crickhowell, Ffordlas	10·10	,,	Killybegs	6·49
,,	New Radnor, Ednol	9·83	,,	Horn Head	5·24

METEOROLOGICAL NOTES ON OCTOBER, 1907.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Temp. for Temperature; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; TS for Thunderstorm; R for Rain; H for Hail; S for Snow.

CAMDEN SQUARE.—Frequent though seldom heavy R, together with a preponderance of cloud and gloom, and absence of sunshine. The mean temp. was 51°·7, or 1°·9 above the average, chiefly owing to the absence of low minima. Duration of sunshine 73·9 hours, and of R 52·8 hours.

CROWBOROUGH.—R 2·08 in. above the average of 36 years, the deficiency since January 1st being reduced to ·17 in. R fell on every day, establishing a record. There was a considerable deficiency of sunshine. Mean temp. 49°·8, or 0°·2 above the average. Sharp TS on 20th.

NORTH CADBURY RECTORY.—Persistently and continuously wet, but with absence of really large falls. The temp., wind and cloud were all about normal, with a marked absence of extremes.

ROSS.—The wettest October since 1818, forming a great contrast to September. The Wye was in flood on 31st.

BOLTON.—Mean temp. 48°·4, or 1°·5 above the average. Sunshine occurred on 20 days, the total being 34·6 hours, or 21·7 below the average. Fog, generally slight, occurred on many days. Short TS, with heavy R, on 22nd.

SOUTHPORT.—Low but steady bar., with exceptional prevalence of light easterly winds, and many rain days, the total fall, however, being ·07 in. less than the average. Mean temp. 49°·9 or 1°·0 above the average. Duration of sunshine 88 hours, or one hour below the average, and of R 74·0 hours. Mean amount of ozone less than half the average.

LILBURN.—Remarkable for excessive R. Harvest was very late, and operations were entirely stopped after 5th. Thousands of acres of corn were still standing at the close of the month.

HAVERFORDWEST.—Very wet and mild, with a heavy gale on 19th. Crops were damaged by the R, and much corn was still out at the end. Duration of sunshine 77·4 hours.

DOUGLAS.—Wet and stormy throughout. The R was exceeded in 1893 only during the last 34 years.

INVERARAY.—Beautiful weather through the greater part of the month.

MULL.—Fine on the whole and very mild, with wind from E. throughout. An abundant harvest was secured in good order early in the month.

STRONVAR.—With the exception of the last six days it was a most depressing and unfavourable month for agriculture generally.

COUPAR ANGUS.—The R was 74 per cent. above the average, and coming at the close of a late season, was the most disastrous on record, though the month closed with promise of better weather. The mean temp. was 47°·1, or 2°·3 above the average.

ABERDEEN.—Wet, with light southerly and westerly winds, and heavy, cloudy skies. Much of the crops was still lying out in the fields at the end.

DRUMNADROCHIT.—R ·03 in. above, and rain days one below, the average of 21 years. The weather was unusually destructive to crops.

DUNMANWAY.—Wet on the whole, but the R was chiefly at night, and many of the days were fine and bright. Heavy frosts on 14th, 15th and 16th.

CORK.—R 1·77 in. above the average, and mean temp. 3°·8 above the average.

DARRYNANE.—R 24 per cent. above the average: it was generally mild, but with a few cold days about the middle. Strong gale and extremely high tide on 18th.

BALLINGARRY.—Persistently wet. "Black rain" fell during the night of 8th as at Birr and elsewhere. The first destructive frost occurred on 16th.

DUBLIN.—One of the wettest months on record, having 29 rain days. The R was, however, persistent rather than heavy. Mean temp. 49°·9, or 0°·4 above the average. TS lasting three hours on 9th.

BANBRIDGE.—Very wet, the R being 1·09 in. above the average of 45 years. The harvest was good, but much will be lost as it could not be got in.

Climatological Table for the British Empire, May, 1907.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Date.	Absolute. Minimum. Temp.	Date.	Average. Max.	Min.	Dew Point.	Humidity.	Absolute. Max. in Sun.	Min. on Grass.	Total Rain Depth.	Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
London, Camden Square	82·3	12	35·9	20	63·5	45·6	45·8	74	124·2	29·8	1·74	17	...
Malta	80·6	14	51·0	2	70·9	59·9	56·6	75	139·6	...	·00	0	3·9
Lagos	92·0	16	70·0	28	87·2	75·4	74·7	76	159·0	67·0	14·86	19	7·3
Cape Town	76·8	4	41·0	28	62·9	50·3	50·9	83	...	...	6·29	19	6·2
Durban, Natal ...	87·3	25	41·1	28	75·4	58·3	...	...	138·3	...	·73	12	3·6
Johannesburg	69·0	14	25·3	28	62·4	44·2	41·1	72	134·1	24·1	·19	3	2·0
Mauritius	81·8	8	55·0	19	77·6	65·4	64·0	77	145·9	46·5	4·71	13	5·9
Calcutta...	102·1	9	68·1	24	95·8	76·7	73·1	69	156·6	67·2	5·48	7	3·7
Bombay...	93·2	31	76·9	11	91·2	79·9	74·3	71	136·2	71·0	·00	0	1·6
Madras	109·0	21	76·3	1	102·1	80·8	72·7	64	146·3	72·6	·00	0	2·8
Kodaikanal	74·3	26	50·2	16	70·2	54·4	49·1	66	140·9	42·4	5·37	18	4·1
Colombo, Ceylon ...	90·4	3, 4	73·5	5	88·1	78·3	75·7	80	156·0	70·8	5·47	22	6·1
Hongkong	86·8	17	67·4	3	80·6	73·0	70·4	82	147·5	...	11·28	14	7·7
Melbourne	73·8	18	39·8	30	63·9	46·8	47·2	76	124·0	30·7	1·66	6	5·8
Adelaide	80·7	16	41·3	1	67·7	49·2	48·6	72	136·6	35·9	2·40	11	4·7
Coolgardie	86·5	4	36·0	21	68·5	46·2	40·4	56	146·0	30·2	1·28	8	2·6
Sydney	73·1	7	45·9	1	65·4	51·8	50·5	84	104·8	35·3	1·70	19	4·3
Wellington	62·5	24	38·9	15	55·6	46·7	44·8	79	102·0	30·0	6·39	20	5·1
Auckland	69·0	8	41·0	21	61·2	49·9	47·7	76	122·0	37·0	3·97	16	5·0
Jamaica, Negril Point.	88·1	2	67·6	9	86·0	71·4	72·3	77	...	...	5·38	19	...
Trinidad	94·0	24	68·0	sevrl	87·6	70·8	73·1	82	160·0	62·0	4·58	14	...
Grenada	87·4	2	70·8	19	84·2	74·3	69·1	73	146·0	...	4·44	15	5·5
Toronto	76·3	18	26·0	12	..	...	...	...	...	...	1·93	9	5·0
Fredericton	..	...	...	...	...	...	...	...	...	...	...	...	...
St. John's, N.B. ...	63·0	17	31·8	3	...	...	...	...	...	...	2·96	10	7·0
Victoria, B.C.	76·7	30	38·0	1	...	...	...	...	...	...	·35	3	5·0
Dawson	80·0	23	23·0	11	...	...	...	...	...	...	1·06	9	5·0

MALTA.—Adopted mean temp. of air 64°·8. Mean hourly velocity of wind 7·6 miles. Mean sunshine 10·8 hours per day.

LAGOS.—R on the 13th 6·62 in.

Johannesburg.—Bright sunshine 287·4 hours.

Mauritius.—Mean temp. of air 0°·5, dew point 1°·3, and relative humidity 2·1 per cent., below averages, and R ·75 in. above average.

MADRAS.—R 4·07 in. below average. TS8 on one day.

KODAIKANAL.—Bright sunshine 229 hours.

COLOMBO.—Mean temp. of air 82°·5 or 0°·1 above, of dew point 0°·4 above, and R 6·30 in. below, averages. Mean hourly velocity of wind 8·6 miles. TS8 on 3 days.

HONGKONG.—Mean temp. of air 76°·2. Bright sunshine 164·0 hours. Mean hourly velocity of wind 13·9 miles.

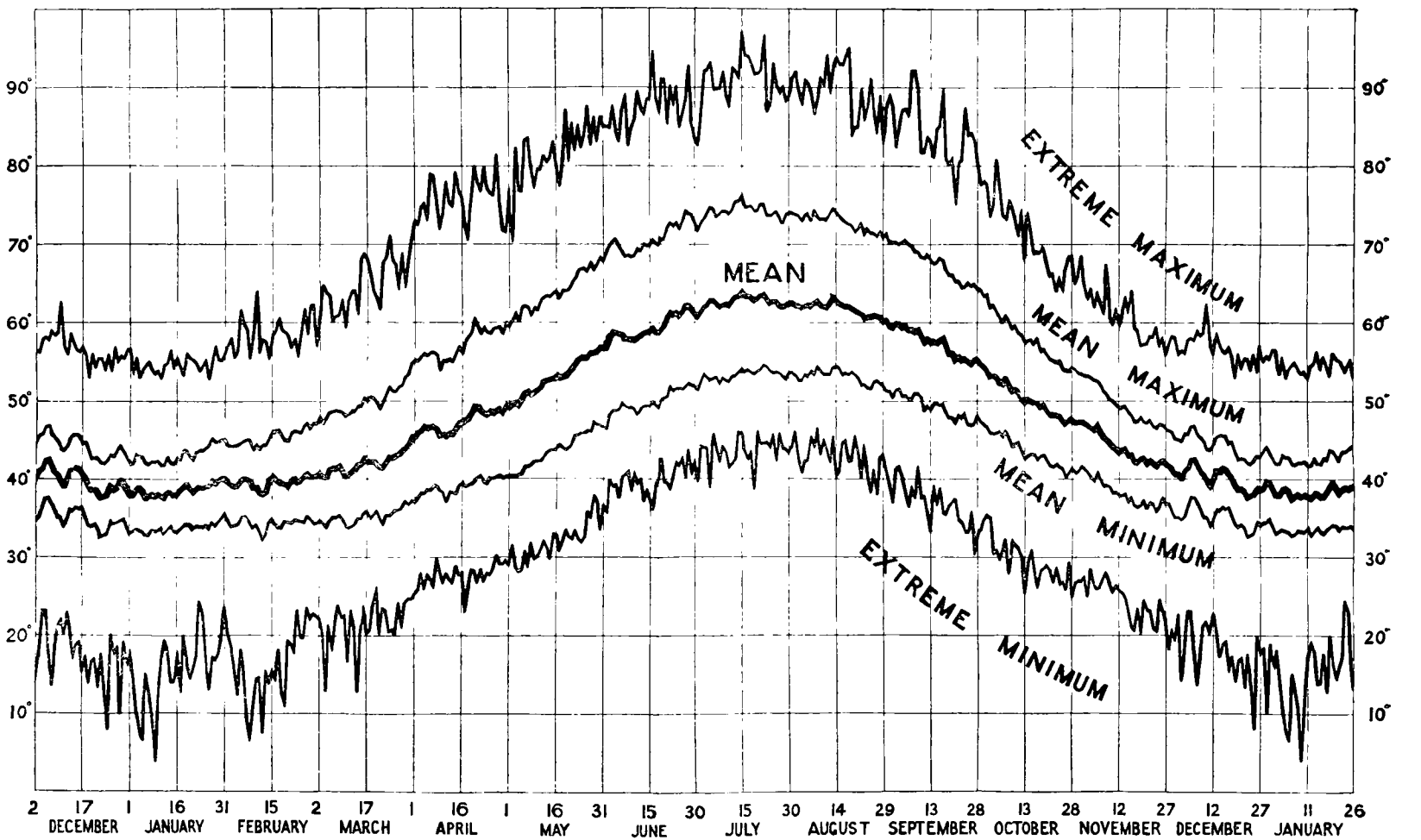
Adelaide.—Mean temp. of air 0°·7 above, and R ·35 in. below, averages.

Sydney.—Mean temp. of air 0°·2 above, and R 3·48 in. below, averages.

Wellington.—Mean temp. of air 1°·7 below, and R 1·73 in. above, averages. Bright sunshine 93·5 hours.

Auckland.—Mean temp. of air and R both slightly below averages of 40 years.

TRINIDAD.—Rainfall ·88 in. above 43 years' average.


TEMPERATURE — ROYAL OBSERVATORY GREENWICH, 65 YEARS 1841 – 1905.
90°
80°
70°
60°
50°
40°
30°
20°
10°
EXTREME MAXIMUM
MEAN
MEAN MAXIMUM
MEAN MINIMUM
EXTREME MINIMUM
2 17 1 16 31 15 2 17 1 16 1 16 31 15 30 15 30 14 29 13 28 13 28 12 27 12 27 11 26
DECEMBER JANUARY FEBRUARY MARCH APRIL MAY JUNE JULY AUGUST SEPTEMBER OCTOBER NOVEMBER DECEMBER JANUARY

Symons's

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GREENWICH AIR TEMPERATURE.

By William Ellis, F.R.S.

The recently published volume of results of Greenwich air temperature for the years 1891 to 1905* is really supplementary to that which appeared in the year 1895 containing similar information for the previous fifty years 1841 to 1890,† thus forming, taken together, a continuous record of air temperature at Greenwich for the 65 years 1841 to 1905. Meteorological observations had always been taken at the Royal Observatory for astronomical purposes, and for many years previous to 1841 a daily meteorological register had been kept by members of the staff, but it was not until the establishment of the Magnetical and Meteorological Department of the Observatory in the latter part of the year 1840 that regular meteorological work was undertaken as part of the official duty. The observations previously for so many years taken at the apartments of the Royal Society at Somerset House were shortly afterwards discontinued.

The first four tables of the two volumes contain severally: (1) the mean temperature of the air; (2) the daily maximum; (3) the daily minimum, and (4) the daily range of temperature for every day throughout the sixty-five years, these being followed by twenty-nine abstract tables giving further information on special points, the results in the later publication being in every sense a direct continuation of those of the earlier volume, so giving every facility for the intercomparison thereof.‡ With the kind consent of the Astronomer Royal, Sir William Christie, I am able to add thereto a

* Reduction of Greenwich Meteorological Observations. Part IV. Temperature of the Air as determined from the Observations and Records of the fifteen years 1891 to 1905.

† Reduction of Greenwich Meteorological Observations. Part III. Temperature of the Air as determined from the Observations and Records of the fifty years 1841 to 1890.

‡ The continuation by Professor Wolfer of Zürich of the tabulation of the frequency of sunspots in the form originally arranged by his predecessor Dr. Wolf, may be noted as an instance of the value of respecting the traditions of an establishment whilst at the same time inaugurating also other advanced work.

reduced copy of the chart of temperature variations forming frontispiece to the second of the Greenwich volumes (an extension of a like chart appearing in the first volume), to which further reference will hereafter be made.

In Table I. we have in addition to the mean daily temperature of the air on every day of each of the 65 years, extremes and means of the daily values, and also means for each month in every year. It is sufficient here to say that from 1841 to 1847 the daily values depend on twelve two-hourly readings of the thermometer of the rotatory stand, except on Sundays when fewer observations were taken; in 1848 on six daily observations of the same thermometer, and from 1849 to 1905 on twenty-four hourly measures of the photographic record reduced to the reading of the thermometer of the rotatory stand, reverting in case of accidental photographic failure to the readings of that thermometer. The results thus depend either on observations in sufficient number of the thermometer of the rotatory stand or on photographic values reduced thereto. For a description of the rotatory stand reference may be made to the Introduction to the first of the two volumes, and for details concerning the treatment of the eye observations to the Introduction to either volume.

The daily maximum and daily minimum temperatures given in Tables II. and III. depend on the readings of the self-registering thermometers of the rotatory stand. From 1841 to 1847 these thermometers were read at 9.20 a.m. instead of at night, consequently the maximum temperature during this period was taken, in accordance with the usual practice of meteorologists, as applying to the preceding civil day. In Table IV. the daily range is the difference between the maximum and minimum readings of Tables II. and III., excepting that the apportionment of the maximum reading from 1841 to 1847 to the preceding day, in the manner mentioned, led on some occasions, in the irregular variations of winter, to an anomalous daily range, in which case a value was obtained by reference to the two-hourly eye observations of the particular day. Extreme and mean values are added in these tables as in Table I.

In Table V. we have the mean temperature of each day of the year (mean of 65 years) as collected from Table I. The lowest daily temperature of the year, 37°·47, is reached on January 12, followed by a rise to 40°·23 on January 31. A further descent to 38°·00 occurs on February 12, after which the rise towards spring begins, receiving, however, a slight check in the last week of April. The highest daily temperature of the year, 64°·01, is reached on July 15, followed by a fall to 61°·78 on August 3. A second rise to 63°·12 occurs on August 13, after which there is continuous fall to the minimum of winter. There are similar variations, Tables VIII. and X., in the corresponding values of mean maximum and mean minimum temperature.

Table XII. gives the mean daily temperature (65-year means)

found by taking the mean of the maximum and minimum temperatures indicated by the self-registering thermometers, and Table XIII. shows the difference on each day between this mean and the true mean temperature of Table V. The monthly means of these daily differences show the mean from the maximum and minimum in January to be too low by 0°·22, in February too high by 0°·23, and continuously too high in March by 0°·61, in April by 0°·81, in May by 0°·77, in June by 0°·89, in July by 1°·07, in August by 1°·24, in September by 0°·96, and in October by 0°·39; in November the maximum and minimum mean is again too low by 0°·08, and in December by 0°·31.

In Tables XIX., XX. and XXI. we have respectively the mean monthly temperature and the corresponding mean maximum and mean minimum temperatures for each month of the 65 years, collected from Tables I. to III., adding here extremes and means and corresponding annual values. The mean annual temperature of the whole series being 49°·56, the years having a lower temperature than 48° were 1845=47°·60, 1853=47°·96, 1855=47°·20, 1860=47°·47, 1879=46°·28, 1887=47°·94 and 1888=47°·78; and those having a higher temperature than 51° were 1846=51°·35, 1857=51°·31, 1859=51°·17, 1868=52°·00, 1872=51°·01, 1893=51°·03 and 1898=51°·45. The years 1860 and 1879 were memorable for low summer temperature. The year of absolute maximum was 1868, 52°·00, warmer than that of absolute minimum, 1879=46°·28, by 5°·72. In regard to secular change the 65 years were divided into five groups of 13 years each, and means of the annual values formed for mean temperature and mean maximum and minimum temperature. These, with the departure from the general average in each case, are as follows:—

Period.	Mean Temperature.		Mean Maximum.		Mean Minimum.	
	°	°	°	°	°	°
1841—1853...	49·47	—0·09	57·89	—0·01	42·58	+0·31
1854—1866...	49·66	+0·10	58·42	+0·52	42·17	—0·10
1867—1879...	49·64	+0·08	58·07	+0·17	42·21	—0·06
1880—1892...	48·89	—0·67	57·16	—0·74	41·59	—0·68
1893—1905...	50·12	+0·56	57·96	+0·06	42·82	+0·55
General Mean	49·56		57·90		42·27	

These differences are interesting, but are clearly accidental, that is, due to unascertained causes, and give really no information on secular change, for which purpose a very much longer period than 65 years is necessary.

Referring again to years of extreme high and low temperature, it may be seen by comparing together the values of Tables XIX. and XXII. that the warm years tend to have a greater, and the colder years a lesser, mean diurnal range. These differences are mainly due to the influence of summer. A warm summer is one of diminished cloud, inducing large diurnal range; a cold summer is one of increased cloud, inducing a lesser diurnal range. One

state is a direct accompaniment of the other. The warm summers of 1868 and 1893 were summers of diminished cloud, and the cold summers of 1860 and 1879 summers of increased cloud, the influence of which conditions is seen in the monthly values of diurnal range in the summers of the years mentioned, as given in Table XXII.

As further indicating the extreme climatic variations experienced in months of different years, the highest monthly mean summer temperature (Table XIX.) was that of July, 1859=68°·9, the lowest month of winter temperature being that of February, 1895=29°·1, showing a divergence between summer and winter of 39°·8. Conversely, the month of lowest summer temperature was that of June, 1871=55°·5, and that of highest winter temperature that of December, 1852=47°·6, a difference between summer and winter of 7°·9 only as compared with the greater divergence of 39°·8.

In following tables, XXIII. to XXXIII., much information is given in regard to the variations and irregularities of atmospheric temperature, to some of the more striking points only of which will it be possible here to refer. In Table XXIII. we have the highest daily maximum and lowest daily minimum temperature recorded in each of the 65 years. The absolute highest was 97°·1 on July 15, 1881, and the absolute lowest 4°·0 on January 9, 1841, a difference of 93°·1. It so happens that this day of absolute maximum, July 15, is also the day of highest mean temperature (65 years), 64°·01, in Table V. as before mentioned, a value which in this table is distinctly higher than adjacent values before and after. The highest daily temperature of summer occurred in 4 years in May, in 11 years in June, in 32 years in July, in 16 years in August, and in 2 years in September; and the lowest daily temperature of winter occurred in 3 years in November, in 17 years in December, in 24 years in January, in 13 years in February, and in 8 years in March.

Table XXIV. deals with the comparative severity of cold in successive winters. Therein is set out the number of days in individual months of the 65 years on which the temperature fell to or below the freezing point. The average yearly number of such wintry days was 54, of which 18 occurred before and 36 after the end of the year. As the day lengthens so the cold strengthens; the coldest portion of the winter coming some weeks after the December solstice, as also the warmest portion comes some weeks after the June solstice. Winters having 80 or more days of this character were those following 1846, 1854, 1878, 1886, 1887 and 1890; and winters having fewer than 30 of such days were those following 1845, 1850, 1883, 1895 and 1897. In the three successive winters following the year 1878 there were in the aggregate 224 of these wintry days; and the average for three years being 162, this indicates an excess of 38 per cent. of such days continued through three winters. Again, in the three successive winters following the year 1885 the wintry days numbered 245, indicating an excess of 51 per cent. above the average continued through three winters.

Contrasting with these high numbers there were in the three successive winters following the year 1895 only 96 similar days, indicating a diminution of 41 per cent. of days continuously through three winters. In Table XXV. we further have the latest day in spring and the earliest day in autumn in each year on which the temperature fell to or below the freezing point, from which we see that the latest day in spring in any year that this occurred was May 24, 1867=31°·9; and the earliest day in autumn, September 27, 1885=30°·6. In the whole 65 years there were 41 instances in all of temperature in May below the freezing point; four times in 1877, and three times in each of the years 1852, 1855, 1857, 1870, 1876 and 1879, or 22 of the 41 instances occurring in seven years. On these occasions there would naturally be a more severe ground frost. Continuing the particulars as regards cold, it appears by Table XXVI. that during the whole period the temperature fell to or below 20° on 176 days, the degree of cold and day of occurrence being given. The absolute lowest was on January 9, 1841=4°·0, as already once mentioned, and there were in all 10 cases of temperature below 10° (including one of 10°·0). Months excessively severe were those of February, 1855, temperature below 20° on 10 days (lowest=11°·1); January, 1881, below 20° on 10 days (lowest=12°·7), and February, 1895, below 20° on 11 days (lowest =6°·9). Other information is given concerning periods during which the temperature remained continuously below freezing. On 14 days during the whole period the maximum daily temperature never reached 25°. The most remarkable case is that of March 13, 1845, with a maximum of 24°·8, a unique circumstance, of which I have myself distinct recollection.

Tables XXIX. to XXXIII. contain information principally in regard to higher temperatures. The average number of days in the year with maximum temperature of 70° or above is 76. The years having more than 100 of such days were, 1846=108, 1857=100, 1858=104, 1859=103 (three years in succession), 1865=132, 1868=108, 1893=104 and 1895=101. There were nine years in which the numbers of such days were few, in seven years ranging from 49 to 57, but in the two years 1860 and 1879 the numbers fell to 28 and 30 respectively. On 55 days during the whole period the temperature rose to 90° or above, of which 6 days were in June, 32 in July, 15 in August and 2 in September. The earliest day in any year was June 16, 1858=94°·5, and the latest day September 8, 1898=92°·1.

Reverting now to the accompanying chart of variations of temperature at Greenwich, there is therein exhibited the mean temperature of the air (average of 65 years) on each day of the year with corresponding mean maximum and mean mimimum temperature, also curves indicating the highest daily maximum and the lowest daily minimum recorded on each day of the year, founded on the numbers of Tables V., VIII., X. and XVII. The three centre

curves, mean maximum, mean temperature, and mean minimum, although depending on the observations of 65 years, show many irregularities, for the most part accidental, that is to say, in the sense of their direct cause being unattainable, to eliminate which a very long period of time would be necessary. Some of the inflections may, however, be real, that is such as more extended observation would intensify. One peculiarity of the curves of extreme daily maximum and extreme daily minimum is the small amplitude of the variations of the maximum in winter as compared with summer, and the greater amplitude of the variations of the minimum in winter as compared with summer. In clear weather under a hot summer sun the daily maximum may rise to 90° or more, but in winter the sun at a low altitude has no such corresponding power. Conversely, in clear weather in winter, the nightly minimum may descend to anything approaching zero; but in the short nights of summer such arctic influences are absent. These circumstances may be indicated numerically by extracting the numbers for a summer and a winter month from Tables V. and XVIII. :—

	July.	January.
	°	°
Mean monthly temperature	62·7	38·6
Mean monthly highest daily maximum	90·9	54·7
Mean monthly lowest daily minimum	43·5	15·5
Maximum higher than mean	28·2	16·1
Minimum lower than mean	19·2	23·1

Thus in summer the maximum rises to a greater extent above the mean than the minimum descends below it, and conversely in winter.

Temperature is the most important factor in meteorology, consequent on its variations being primarily due to action of the sun. Not by the influence of sunspot variation, which, if assignable, is practically insignificant in all questions of weather change. It is from the direct action of solar heat that all else flows—the seasonal variation, winter and summer; the diurnal variation, day and night; atmospheric currents, winds and storms, and also evaporation, cloud, and rainfall, and these are the elements that produce, in all its varied conditions, what we call weather.

ROYAL METEOROLOGICAL SOCIETY.

THE opening meeting of the new session was held on Wednesday evening, November 20th, at the Institution of Civil Engineers, Great George Street, Westminster, the President, Dr. H. R. Mill, being in the chair.

The President, in a few introductory remarks, referred to several points of interest in connection with the work of the Society, and also to some important changes which have occurred in colonial and foreign meteorological organizations. He congratulated the Society on the large number of new Fellows to be ballotted for that evening, and the still larger number to be proposed.

The meeting was largely devoted to the consideration of the Reports on the results obtained by the balloon observations made in the British Isles, July 22nd to 27th. The International Aeronautical Committee has for some years set apart the first Thursday in each month for the ascent of kites and balloons, but at the conference held at Milan last year, it was decided to make a special effort to obtain information on a series of consecutive days, and the last week in July was finally decided upon for the purpose.

The Joint Kite Committee of the Royal Meteorological Society and the British Association, and the Meteorological Office, participated in the work, and organized the following stations in the British Isles, *viz.*, Pyrton Hill, Oxon, and Crinan, on the west coast of Scotland, both under the direction of Mr. W. H. Dines, F.R.S.; Manchester, under the direction of Mr. J. E. Petavel, F.R.S.; Sellack, Herefordshire, Capt. C. H. Ley, R.E.; Ditcham Park, Petersfield, Mr. C. J. P. Cave; and Dublin, Prof. W. E. Thrift.

Twenty-five balloons, with registering instruments, were sent up during the week, and fourteen of these have been found. Nearly all the balloons drifted to the eastward, but several which reached a fair height fell within 20 miles of their starting point. The heights ranged up to over 12½ miles, the average being about 7½ miles. It has been known for some time that after a certain height is reached the air temperature ceases to fall. This layer is of variable height, and is known as the region of the "great inversion." Above this comes the isothermal region, where the temperature remains almost unaltered with change of height. The ascents which have been made in England have proved the existence of the isothermal conditions about 7½ miles. There also seems to be some slight evidence that the air at extreme heights is warmer in the evening than in the morning.

A paper giving a "Discussion of the Meteorological Observations at the British Kite Stations, 1906-7," by Miss M. White, Mr. T. V. Pring and Mr. J. E. Petavel, F.R.S., was also read. Investigations of the upper air by means of kites carrying meteorographs are carried

out at four British stations, *viz.*, Pyrton Hill, Oxon; Ditcham Park, Petersfield; Brighton; and Glossop Moor, Derbyshire. The authors have made an analysis of the records obtained during the past session. Under ordinary circumstances the air temperature decreases continually with increasing height. The rate of fall is, in the daytime, very rapid close to the ground and diminishes at higher levels. The temperature gradient varies with the direction and the velocity of the wind, and also with the amount of cloud, being greatest for a north-west wind and on clear and fine days. It appears that the direction of the wind alters at high levels, rotating in a clock-wise direction, thus a south wind tends to become more westerly.

The President, Mr. W. H. Dines, Mr. J. E. Petavel, Mr. W. Marriott, Mr. C. J. P. Cave, Capt. C. H. Ley, Dr. W. N. Shaw and Mr. J. E. Clark, spoke on the above papers.

The following were elected Fellows of the Society :—

Mr. W. S. Allely, Mr. H. G. Banerji, M.A., Lieut. E. H. Bate, R.N., Mr. R. J. Clarke, Mr. A. Dallas, Mr. C. N. Day, Mr. J. Desmond, Capt. J. Elmes, Capt. H. Findlay, Capt. E. Gates-James, Mr. W. Gaw, Mr. H. Gorsain, Capt. G. Gregory, Capt. H. Hollies, Mr. H. J. Hunt, Mr. A. Lander, Capt. W. G. Lingham, Capt. A. W. McKellar, Mr. E. N. Plevins, Capt. S. W. V. Plunkett, Mr. T. Rule, Capt. R. W. Scarff, Capt. W. S. Shelford, Mr. E. J. Walsh, and Capt. R. C. Warden.

Correspondence.

To the Editor of Symons's Meteorological Magazine.

FOG IN TOWN AND COUNTRY ON NOV. 11th & 20th.

On November 11th I noticed a striking instance of the dryness of London fog as compared with nearly simultaneous fog at a place 15 miles away in the outer suburban area—to all intents and purposes perfect country. Travelling to town in the middle of the day I have only to record passing through several dense banks of damp white fog on the journey. The afternoon in London was hazy but sunny, with every promise of thick fog settling down before nightfall. At 7.0 p.m. a thick dry fog prevailed, with the pungent fumes of oxide of sulphur very noticeable; torches were carried in the streets and fires stationed at street junctions. I left Marylebone station at 7.30 p.m., and reaching Northwood at 8.30 (the train was half-an-hour late), found the fog just as dense as in town, but perfectly pure and extremely *wet*—so wet that drizzling rain was falling. This instance struck me as a good illustration of the drying qualities attaching to the large carbonaceous nuclei of town fog.

It may be interesting also to place on record that while Nov. 20th

was a day of darkest night in town through *overhead* fog, there was no surface fog. At Northwood, and I suppose in the country generally immediately to the north of London, there was a thick yellowish-white surface-fog all day, but no darkness. Can any readers supply particulars as to the qualities of fog or weather on this day in their respective neighbourhoods?

L. C. W. BONACINA.

Northwood, Middlesex, Nov. 21st, 1907.

THE THUNDERSTORM IN SOUTH-EAST CLARE ON THE 22nd JULY, 1907.

In continuation of his article in the August Magazine (Vol. 42, p. 133), Colonel W. A. Bentley sends us the following copy of a letter from R. S. Parker, Esq., J.P. :—

"It was the second thunderstorm which did the damage here on the 22nd ult. We had heavy thunder all that afternoon over towards Keeper, and working on by Thontina; but about 5.30 p.m. we began to hear another thunderstorm towards the S.W., working, as you say, to the N.E. The thunder and lightning soon got very bad, but no rain till after seven. Then it poured sometimes more and sometimes less, when about eight a flood burst on us from above, which swept the garden wall, some 20 yards broad, cut a chasm through the ground at the top of the garden, and filled up the bottom with stones and gravel. Then the water rose in our back yard several feet high, and in another moment would have inundated the house, only fortunately the yard wall gave way and let it off, leaving offices and yard full of mud and gravel. Then it carried away about 15 yards of wall near my gate lodge, to say nothing of destroying about four acres of hay—cut and uncut—and putting stones and gravel on the land. I think there must have been a small waterspout up behind us, for though the rain was desperate it seemed hardly sufficient to make such a torrent.

"The stream is usually quite a small one, only starting a few fields above us. The Board of Works people, who keep a rain gauge, say there was 3½ inches of rain, and I fancy we had more here even than they had at Killaloe. I have not been up the glen, but I saw Ballycorney bridge, which is ready to fall. A fine bridge near Garranboy is gone altogether, and a very deep hole washed out at the lower side of Ballyheigue bridge. It will cost the county a good bit of money. I am afraid my observations of the storm from a meteorological point of view are of no interest. You seem to have told them pretty accurately as to the hours and direction of the storm. There was a waterspout seen over the lake on the 22nd by a great many people."

Bally Valley, Killaloe, co. Clare, 12th August, 1907.

He adds that Bally Valley House, where Mr. Parker lives, is situate a mile north of Killaloe, on the side of the mountain overlooking Lough Derg, which is the lake he mentions. The house is high above the Shannon.

OZONE.

WILL you grant me a small space in the *Meteorological Magazine* to ask if any recent research has been made as to the testing of Ozone in the air? If so, we should have a better, or say more scientific, definition of the element; and whether the symbol Oz is the proper expression, or what? I suppose it is the province of the chemist rather than of the meteorologist to determine the point.

It is some years since Dr. R. H. Scott in his "Instructions" gave the following opinion, as expressed by the Vienna Congress:—"The existing methods of determining the amount of ozone in the atmosphere are insufficient, and the Congress therefore recommends investigations for the discovery of better methods."

Have any investigations been made all these years?

If you would kindly stimulate the matter into activity you would do a good service. We should know once for all whether it is worthy of a proper recognition.

TURNOR PEEL.

Deal, 23rd November, 1907.

THE GREENWICH SUMMER OF 1907.

THERE is an unfortunate misstatement in my letter on p. 196; it looks as if a line had slipped out.

The correct statement is to this effect: "On 69 of the 92 days the mean temperature was under the (day) average, and the thermometer never (in those three months) got above the seventies, though, &c." Perhaps you will kindly correct in your next issue.

ALEX. B. MACDOWALL.

Brooklyn, Letchworth, 21st November, 1907.

OCTOBER, 1907.

RAIN fell on twenty-five days, the total being 7·47 inches. There were heavy falls as under: 14th ·82 in., 17th 1·06 in., 18th ·78 in., 19th ·42 in., 20th ·35 in., 28th ·47 in.., 29th 1·00 in. It was a wet month without any dry periods. Our ten year average for the month is 4·48 in.; for the ten months, January–October, 27·28 in. The ten months of 1907 have totalled 27·65 in., or ·37 in. in excess of average. The October rainfall has exceeded 7 inches as under; the figures, with the exception of 1907, are Mr. Penfold's, and go back to 1873.

October,	1882	8·16 in.
,,	1889	7·93 ,,
,,	1891	8·80 ,,
,,	1903	9·21 ,,
,,	1907	7·47 ,,

T. P. NEWMAN.

Hazelhurst, Haslemere, Surrey.

REVIEWS.

Results of the Magnetical and Meteorological Observations made at the Royal Observatory, Greenwich, in the year 1905, under the direction of Sir W. H. M. Christie, K.C.B. . . . . Published by order of the Board of Admiralty in obedience to His Majesty's command. Edinburgh, Printed for His Majesty's Stationery Office, 1906. Size $12\frac{1}{2} \times 10$. Pp. $8 + lviii. + (cxxviii)$.

THIS invaluable record of the meteorology of the London district is arranged on the familiar plan. It is to be regretted that the hour of observations on Sundays is different from that on the other six days of the week, and that certain observations are omitted on "Sundays and a few other days"; but a more regrettable circumstance about the meteorological equipment of this national observatory is the absence of a rain gauge of the deep vertical rim pattern, now happily in use at all stations of the Meteorological Office, of the Royal Meteorological Society, and of most private observers. The absence of a Dines' pressure tube anemometer is another matter of regret; and we believe that were a meteorologist appointed to the Board of Visitors, the desirability of bringing the efficiency and completeness of the meteorological equipment into line with the astronomical and magnetic departments would be urged upon those responsible with a force that external criticism cannot bring to bear.

Hourly Readings obtained from the self-recording instruments at four observatories in connection with the Meteorological Office, 1906. Thirty-eighth year. New series. Vol. VII. London: Printed for His Majesty's Stationery Office, 1907. Size, 12×10. Pp. xiv. + 198. Price, 25s.

WE offer our hearty congratulations to the Meteorological Office on the early appearance of this volume, which, by the new method of publication in monthly numbers, is available when most likely to be useful. But by what system of official arithmetic 12 monthly numbers at 6d. each, with 14 pp. of introduction, are priced at 25s., in a blue paper cover, we are at a loss to understand.

Grundzüge einer Theorie der synoptischen Luftdruckveraenderungen, II. Mitteilung [Principles of a theory of synoptic pressure changes. Second communication], von FELIX M. EXNER. Aus den Sitzungberichten der k. Akademie der Wissenschaften in Wien. Math.-Naturw. Klasse Bd., CXVI. Abt. IIa. Wien, 1907. Size, $9\frac{1}{2} \times 6\frac{1}{2}$. Pp. 36. Plates.

THIS is the continuation of the investigation, the first part of which was noticed in the May number, p. 73. Dr. Exner explains that he

treats the discussion of the diurnal variations merely as a hypothesis, though in time it may be so developed as to be of service in weather predictions. The treatment of the subject in the present communication is more general than in the earlier.

Internationale Meteorologische Kodex. Im Auftrage des International Meteorologischen Komitees, bearbeited von [International Meteorological Code. Prepared on behalf of the International Meteorological Committee by] G. HELLMANN, Berlin, und H. H. HILDEBRANDSSON, Upsala. Deutsche Ausgabe. Berlin, 1907. Behrend & Co. Size, 11 × by 7½. Pp. viii. + 82.

THE German edition of a systematic collection of the Resolutions passed at the meetings of the International Meteorological Committee since 1871, which have hitherto appeared only in the various volumes of Minutes. The resolutions are arranged under the heads of the various meteorological phenomena dealt with, and there is a complete index embracing authors and subjects.

Returns of Rainfall, &c., in Dorset for 1906, by H. STILWELL. From *Proceedings* Dorset Natural History and Antiquarian Field Club. Dorchester, 1907. Size, 8½ × 5½. Pp. [14].

The Cornwall County Council Annual Report. Vital Statistics and Meteorological Summary for 1906. Truro, 1907. Size, 11 × 8½. Pp. 28.

THESE are some of the valuable county reports dealing mainly with rainfall that we have received, and we must acknowledge also, with regret, that our space will not admit of a more adequate notice, the reports for 1906 of the Fernley Observatory, *Southport*, admirably edited as usual by Mr. Baxendell, the *Bath* Health Reports by Dr. Symons, the indefatigable Medical Officer of Health, the *Falmouth* Observatory, where Mr. Kitto's name is a guarantee of first-class work, Mr. A. W. Preston's meteorological notes for *Norwich*, and the Coats' Observatory, *Paisley*, where Mr. Donald Maclean reports for the Observatory Committee of the Paisley Philosophical Institution.

A Discussion of the Anemographic Observations recorded at Rangoon from 1878 to 1901 . . . . at Chittagong from 1879 to 1896 . . . . at Allahabad from 1890 to 1904 . . . . from 1878 to 1892, by SIR JOHN ELIOT, M.A., F.R.S., K.C.I.E. *Memoirs of the Indian Meteorological Department.* Vol. XVIII., part 1, Calcutta, 1907, Vol. XVIII., part 3, London, 1907. Size, 12 × 9½. Pp. 1-122, 283-430, with plates.

THIS important discussion of the winds at various stations in India, where anemometer records are available, is copiously illustrated by wind-roses, curves of diurnal variations of the wind, and other diagrams.

An account of the preparations made for the determining the conditions of the Upper Air in India by means of Kites, by J. A. FIELD, ESQ., B.A., Deputy Meteorologist. *Memoirs of the Indian Meteorological Department.* Vol. XX. Part I. Calcutta, 1906. Size, 12 × 9½. Pp. 16. Plates.

PARTICULARS of the instruments and methods, with the record of ascents near Karachi.

Mysore Government Meteorological Department. Fourteenth Annual Report on Meteorology in Mysore, 1906. Report on Rainfall Registration in Mysore, 1906. By JOHN COOK, M.A., F.R.S.E. Bangalore, 1907. Size, 12 × 10. Pp. xviii. + 122 + 48. Plates.

MR. COOK is much to be congratulated on the promptitude with which he has completed his annual volumes and carried them through the press.

The Windrush at Biggin. By J. E. CLARK, B.A., B.Sc. [Privately printed]. Size, 9½ × 6, pp. 4. Plates.

THE "windrush" in question is not the tributary of the Thames, but a severe squall which occurred at Biggin, near Church Fenton, Yorkshire, during the passage of the famous line-squall of 8th February, 1906. Mr. Clark gives an excellent description of the damage done, illustrated by maps of the line-squall and photographs of the wrecked farm-buildings, the tiles of which were reported to have been blown about like feathers.

Ueber tatsächliche vieltägige Perioden des Luftdruckes [On actual many-day periods of atmospheric pressure]. Von PROF. DR. E. HERRMANN. Sonderabdruck aus "Annalen der Hydrographie, &c." 1907. Size, 10½ + 7½. Pp. 8. Plates.

THE author believes that a solution of the varied and apparently chaotic movements of the barometer may be found in considering atmospheric disturbances to be due to the combination of onward moving waves of different velocities and the surge-like swingings of air to and fro without progressive movement. He traces a 51 and 59-day periodicity in atmospheric pressure, in which he sees evidence of lunar influence.

The Climatology of Ireland in relation to the Public Health. By SIR JOHN W. MOORE, M.D., &c. (From *Journal of Royal Sanitary Institute*, Vol. **28** (1907), No. 8.) Size, 10 × 7. Pp. 12.

AN address given at the recent conference of the Royal Sanitary Institute in Dublin. The author says:—"And speaking of climate

in general and of the climate of Ireland in particular, I may frankly state that the latter is probably the most temperate climate in the world, as it is certainly most conducive to health and to longevity."

Notes on Maritime Meteorology. By M. W. CAMPBELL HEPWORTH, C.B., Commander R.N.R. (Retired). With 7 plates. London, George Philip & Son, Ltd., 1907. Size, $8\frac{1}{2} \times 5\frac{1}{2}$. Pp. viii. + 90.

CAPTAIN HEPWORTH has conferred an obligation on more than sailors in bringing together the seven chapters of this little book. Each chapter was prepared separately for the most part from his own observations and communicated to the Royal Meteorological Society, the Royal United Service Institute, the Royal Society of New South Wales and the London Shipmasters' Society; but in the scattered publications of these institutions it was a serious matter to consult them all. The chapters bear the following titles:—I. Meteorology—a Factor in Naval Warfare; II. The Value of Meteorological Observations at Sea and some hints upon observing; III. Weather Forecasts and Storm Warnings on the Coast of South Africa; IV. Wind Systems and Trade Routes between the Cape of Good Hope and Australia; V. The Tracks of Ocean Wind Systems in transit over Australasia; VI. Current Observations on the Canadian-Australian route; VII. Remarks on the Weather Conditions of the steamship track between Fiji and Hawaii.

Regenkarte von Deutschland, mit erläuternden Bemerkungen. Im amtlichen Auftrage bearbeitet von [Rainfall Map of Germany, with explanatory notes. Prepared officially by] Professor DR. G. HELLMANN. Berlin, 1906. Dietrich Reimer. Size, $12\frac{1}{2} \times 10$. [*Map folded.*] Price 3 marks.

THIS map appeared with Dr. Hellmann's three great volumes on German Rainfall. It is on the scale of 1 : 1,800,000, or about 29 miles to an inch, and has been prepared from the records at 3000 stations for the period of ten years, 1893—1902. The map is coloured in lightening shades of brown from the lowest rainfall up to 60 centimetres ($23\frac{1}{2}$ in.), and then, in deepening shades of blue, up to the highest rainfall shown; so that the browner the country is shown the drier it is, and the bluer the wetter. The result is very effective in distinguishing the wetter and drier parts of the country. The map shows in a very beautiful manner the dependence of rainfall on the configuration of the land, and on distance from the sea whence the prevailing winds blow. It should interest both students and practical men, and its very low price (3s.) and fine execution are worthy of remark.

METEOROLOGICAL NEWS AND NOTES.

THE COMMONWEALTH OF AUSTRALIA has inaugurated a Meteorological Bureau for the whole continent, with its headquarters in Melbourne, and Mr. H. A. Hunt has been appointed the first Commonwealth Meteorologist. This is an event of very great importance in the meteorological world, for the new Bureau will have control of the weather service over an area scarcely less than that of the United States or the Dominion of Canada, and very much larger than that of India.

THE TEACHING OF ELEMENTARY METEOROLOGY of the simplest kind in schools has recently been attracting considerable attention. The Council of the Royal Meteorological Society desire to encourage such teaching, and they are inviting elementary teachers and others to send in essays in the form of an original Nature Study lesson on Weather or Climate (not exceeding 1,500 words in length), together with a brief synopsis of five other lessons to cover the whole subject of Climate and Weather. If essays of sufficient merit are received, three prizes will be awarded of £5, £3 and £2, respectively. The essays are to be sent in before January 31st, 1908, and addressed to Mr. William Marriott, Assistant Secretary, Royal Meteorological Society, 70, Victoria Street, London, S.W., from whom further information can be obtained. This prize competition will, no doubt, stimulate many teachers to take an interest in the subject, and to impart to their scholars some definite teaching on it.

MESSRS. C. F. CASELLA & CO. send us two illustrated catalogues, one of Richard's self-recording instruments, with a supplement giving a selection of the firm's own instruments, and the second dealing with anemometers, air meters and wind direction instruments. Many of these instruments are both interesting and ingenious. We note that Professor A. Laurence Rotch's instrument for ascertaining the true direction of the wind on board a rapidly moving steamer is included in the list. Both pamphlets are models of clear description and attractive printing.

THE FRANCO-BRITISH EXHIBITION OF 1908 will contain a section representative of British Science, and a fair amount of space will be devoted to meteorology. If any reader proposes to lend instruments of historic interest for the department of meteorology, an early intimation should be made to Dr. W. N. Shaw, 63, Victoria Street, S.W., the Convenor of the Sub-Committee on Meteorology.

RAINFALL OBSERVERS ARE REMINDED that any changes in the pattern or position of their rain gauges should be made on January 1st, and it would be well if all Observers were to make a careful inspection of their gauges so as to be sure that they are in good condition and not unduly sheltered. A copy of a revised edition of the Rules for Rainfall Observers will be sent free on application to Dr. H. R. Mill, 62, Camden Square, London, N.W.

TEMPERATURE FOR NOVEMBER, 1907.

STATION.	COUNTY.	Lat. N.	Long. W. [*E.]	Height above Sea. ft.	TEMPERATURE. Max.		TEMPERATURE. Min.		No. of Nights at or below 32° Shade.	No. of Nights at or below 32° Grass.
		° ′	° ′		°	Date.	°	Date.		
Camden Square	*London*	51 32	0 8	111	60·4	9	30·1	16	3	9
Tenterden	*Kent*	51 4	*0 41	190	60·0	9	30·0	12	4	9
West Dean	*Hampshire*	51 3	1 38	137	58·0	9	26·0	16	9	17
Hartley Wintney	,,	51 18	0 53	222	59·0	15. 16	25·0	16	7	16
Hitchin	*Hertfordshire*	51 57	0 17	238	56·0	2	25·0	29	10	...
Winslow (Addington)	*Buckinghamshr.*	51 58	0 53	309	57·0	2, 9	23·0	30	9	13
Bury St. Edmunds (Westley)	*Suffolk*	52 15	*0 40	226	60·0	9	27·8	26	5	...
Brundall	*Norfolk*	52 37	*1 26	66	57·6	9	28·0	26	5	13
Winterbourne Steepleton	*Dorset*	50 42	2 31	316	57·9	9	26·8	16	5	10
Torquay (Cary Green)	*Devon*	50 28	3 32	12	60·0	3	36·5	16	0	3
Polapit Tamar [Launceston]	,,	50 40	4 22	315	57·8	5	28·3	16	2	13
Bath	*Somerset*	51 23	2 21	67	58·7	9	27·0	16	6	...
Stroud (Upfield)	*Gloucestershire*	51 44	2 13	226	55·0	9	30·0	29	4	...
Church Stretton (Wolstaston)	*Shropshire*	52 35	2 48	800	55·0	9	...	...	...	...
Coventry (Kingswood)	*Warwickshire*	52 24	1 30	340	54·0	2, 9	27·0	15	6	...
Boston	*Lincolnshire*	52 58	0 1	25	55·0	1	26·0	26	4	...
Worksop (Hodsock Priory)	*Nottinghamshire*	53 22	1 5	56	57·0	5	24·5	26	7	17
Derby (Midland Railway)	*Derbyshire*	52 55	1 28	156	57·0	2	26·0	29	9	...
Bolton (Queen's Park)	*Lancashire*	53 35	2 28	390	55·9	3	28·2	30	4	12
Wetherby (Ribston Hall)	*Yorkshire, W.R.*	53 59	1 24	130	...	...	...	...	...	...
Arncliffe Vicarage	,, ,,	54 8	2 6	732	...	...	...	...	...	...
Hull (Pearson Park)	,, *E.R.*	53 45	0 20	6	58·0	2	28·0	16†	6	13
Newcastle (Town Moor)	*Northumberland*	54 59	1 38	201	...	...	...	...	...	...
Borrowdale (Seathwaite)	*Cumberland*	54 30	3 10	423	58·5	2	26·7	26	3	...
Cardiff (Ely)	*Glamorgan*	51 29	3 13	53	...	...	...	..	...	...
Haverfordwest (High Street)	*Pembroke*	51 48	4 58	95	55·8	5	29·1	21	...	10
Aberystwyth (Gogerddan)	*Cardigan*	52 26	4 1	83	58·0	5	23·0	29	...	...
Llandudno	*Carnarvon*	53 20	3 50	72	56·2	4	32·2	30	...	...
Cargen [Dumfries]	*Kirkcudbright*	55 2	3 37	80	55·0	2, 4	22·0	19	11	...
Lilliesleaf (Riddell House)	*Roxburgh*	55 31	2 46	550	...	...	...	...	...	...
Edinburgh (Royal Observy.)	*Midlothian*	55 55	3 11	442	55·3	4	29·9	25	3	11
Girvan (Pinmore)	*Ayr*	55 10	4 49	207	58·0	3	24·0	30	13	..
Glasgow (Queen's Park)	*Renfrew*	55 53	4 18	144	58·0	4	25·0	25	8	23
Tighnabruaich	*Argyll*	55 55	5 14	50	48·0	2, 3, 4, 5	25·0	28	15	15
Mull (Quinish)	,,	56 36	6 13	35	56·0	11	...	...	...	...
Dundee (Eastern Necropolis)	*Forfar*	56 28	2 57	199	55·5	4	26·3	25	9	...
Braemar	*Aberdeen*	57 0	3 24	1114	...	...	...	...	...	...
Aberdeen (Cranford)	,,	57 8	2 7	120	53·0	2, 4	24·0	18	15	...
Cawdor	*Nairn*	57 31	3 57	250	...	...	...	...	...	...
Invergarry	*E. Inverness*	57 4	4 47	130?	...	...	...	...	...	...
Loch Torridon (Bendamph)	*W. Ross*	57 32	5 32	20	...	...	...	...	...	...
Dunrobin Castle	*Sutherland*	57 59	3 56	14	53·5	2	30·5	25	...	6
Castletown	*Caithness*	58 35	3 23	100	53·0	4, 14	21·0	25	12	12
Killarney (District Asylum)	*Kerry*	52 4	9 31	178	59·0	2	29·0	30	...	...
Waterford (Brook Lodge)	*Waterford*	52 15	7 7	104	56·0	2	26·0	21	8	...
Broadford (Hurdlestown)	*Clare*	52 48	8 38	167	54·0	2	27·0	24	12	...
Abbey Leix (Blandsfort)	*Queen's County*	52 56	7 17	532	56·0	2, 3	...	...	...	...
Dublin (Fitz William Square)	*Dublin*	53 21	6 14	54	56·1	4	29·8	25	2	8
Ballinasloe	*Galway*	53 20	8 15	160	62·0	2	20·0	25, 30	16	...
Clifden (Kylemore House)	,,	53 32	9 52	105	...	...	...	...	...	...
Crossmolina (Enniscoe)	*Mayo*	54 4	9 18	74	...	...	...	...	...	...
Seaforde	*Down*	54 19	5 50	180	53·0	2, 3	28·0	24	7	19
Londonderry (Creggan Res.)	*Londonderry*	54 59	7 19	320	...	...	...	...	...	...
Omagh (Edenfel)	*Tyrone*	54 36	7 18	280	...	...	...	...	...	...

and 26, 30.

RAINFALL FOR NOVEMBER, 1907.

RAINFALL OF MONTH.							RAINFALL FROM JAN. 1.					
Aver. 1870-99.	1907.	Diff. from Av.	% of Av.	Max. in 24 hours.		No. of Days	Aver. 1870-99.	1907.	Diff. from Aver.	% of Av.	Mean Annual 1870-1899.	STATION.
				in.	Date.							
in.	in.	in.					in.	in.	in.		in.	
2·45	2·16	— ·29	88	·49	18	12	23·04	19·24	— 3·80	84	25·16	Camden Square
3·22	2·64	— ·58	82	1·29	26	11	25·62	22·08	— 3·54	86	28·36	Tenterden
3·25	2·75	— ·50	82	·58	25	15	27·19	24·96	— 2·23	92	29·93	West Dean
3·03	2·23	— ·80	74	·48	26	13	24·55	23·78	— ·77	97	27·10	HartleyWintney
2·56	2·27	— ·29	89	·64	26	14	22·61	21·25	— 1·36	94	24·66	Hitchin
2·63	2·07	— ·56	79	·63	26	18	24·48	21·75	— 2·73	89	26·75	Addington
2·50	2·39	— ·11	96	·56	26	14	23·28	21·73	— 1·55	93	25·39	Westley
2·71	2·48	— ·23	92	·58	26	19	23·27	22·81	— ·46	98	25·40	Brundall
4·82	4·72	— ·10	98	1·30	8	20	34·87	33·74	— 1·13	97	39·00	Winterbourne Stpltn
3·71	4·09	+ ·38	110	·94	8	17	31·54	28·85	— 2·69	92	35·00	Torquay
4·29	3·50	— ·79	82	·68	17	21	34·46	31·66	— 2·80	92	38·85	Polapit Tamar
3·06	2·23	— ·83	73	·43	8, 25	17	27·99	27·53	— ·46	98	30·75	Bath
2·99	2·14	— ·85	72	·39	8	17	27·37	26·59	— ·78	97	29·85	Stroud
3·18	3·12	— ·06	98	·45	8, 25	20	30·12	32·17	+ 2·05	107	33·04	Wolstaston
2·80	2·37	— ·43	85	·50	24	13	26·77	25·83	— ·94	96	29·21	Coventry
2·14	2·12	— ·02	99	·57	24	16	21·51	19·95	— 1·56	93	23·30	Boston
2·10	1·91	— ·19	91	·40	26	19	22·68	21·29	— 1·39	94	24·70	Hodsock Priory
2·28	1·83	— ·45	80	·36	24	21	23·90	25·53	+ 1·63	107	26·18	Derby
3·91	3·57	— ·34	91	·82	22	21	38·24	40·97	+ 2·73	107	42·43	Bolton
2·23	3·20	+ ·97	114	·75	26	19	24·77	26·68	+ 1·91	109	26·96	Ribston Hall
6·00	4·64	—1·36	77	1·00	22	22	54·55	54·31	— ·24	99	60·96	Arncliffe Vic.
2·45	2·29	— ·16	94	·73	26	17	24·66	22·27	— 2·39	90	27·02	Hull
2·65	1·77	— ·88	67	·45	26	20	25·35	24·27	— 1·08	96	27·99	Newcastle
13·91	11·43	—2·48	82	1·75	27	17	117·98	109·68	— 8·30	93	132·68	Seathwaite
4·26	2 9	— ·97	77	·60	22,25	19	38·38	34·78	— 3·60	91	42·81	Cardiff
5·41	4·23	—1·18	78	·82	22	21	42·66	39·91	— 2·75	94	47·88	Haverfordwest
4·68	4·40	— ·28	94	·74	23	22	40·92	42·46	+ 1·54	104	45·41	Gogerddan
3·38	2·46	— ·92	73	·39	26	21	28·03	24·17	— 3·86	86	30·98	Llandudno
4·50	3·81	— ·69	84	1·18	26	13	38·75	43·76	+ 5·01	113	43·43	Cargen
3·29	...	...	...	...	...	...	29·86	...	...	...	33·04	Riddell House
...	1·06	...	...	·31	12	12	...	26·42	...	...	...	Edinburgh
5·31	6·40	+1·09	121	1·18	22	27	43·63	...	...	...	48·87	Girvan
3·48	2·31	—1·17	66	·60	22	18	32·27	36·65	+ 4·38	114	35·80	Glasgow
6·21	5·76	— ·45	93	·78	26	18	51·57	56·86	+ 5·29	110	57·90	Tighnabruaich
6·43	6·70	+ ·27	104	1·07	26	19	51·05	48·04	— 3·01	94	57·53	Quinish
2·76	1·40	—1·36	51	·80	26	12	26·22	27·85	+ 1·63	106	28·95	Dundee
3·94	3·15	— ·79	80	...	...	...	32·92	28·97	— 3·95	88	36·07	Braemar
3·47	2·49	— ·98	72	·77	26	14	29·62	29·10	— ·52	98	33·01	Aberdeen
2·65	1·76	— ·89	66	·45	12	14	26·84	28·89	+ 2·05	108	29·37	Cawdor
5·98	6·29	+ ·31	105	1·60	13	10	49·33	52·63	+ 3·30	107	56·00	Invergarry
9·79	9·37	— ·42	96	1·80	21	20	77·46	81·81	+ 4·35	106	86·50	Bendamph
3·26	2·50	— ·76	77	·91	26	11	28·21	29·36	+ 1·15	104	31·60	Dunrobin Castle
...	2·08	...	...	·30	26	21	...	28·17	...	...	...	Castletown
5·85	4·22	—1·63	72	1·03	21	19	51·47	38·67	—12·80	75	58·11	Killarney
3·91	5·38	+1·47	138	·94	4	16	34·99	34·51	— ·48	99	39·30	Waterford
3·19	4·34	+1·15	136	1·15	27	19	30·10	33·05	+ 2·95	110	33·47	Hurdlestown
3·21	3·83	+ ·62	119	·86	27	18	31·71	33·96	+ 2·25	107	35·19	Abbey Leix
2 60	2·58	— ·02	99	·53	26	14	25·36	24·83	— ·53	98	27·75	Dublin
3·60	3·61	+ ·01	100	·70	25	22	33·41	33·02	— ·39	99	37·04	Ballinasloe
8·25	...	...	...	...	...	...	71·24	...	...	...	80·23	Kylemore House
5·63	5·13	— ·50	91	1·27	21	25	44·69	45·87	+ 1·18	103	50·50	Enniscoe
3·94	3·05	— ·89	77	1·00	27	14	34·97	36·22	+ 1·25	104	38·61	Seaforde
4·19	3·28	— ·91	78	·74	26	22	36·89	42·86	+ 5·97	116	41·20	Londonderry
3·53	...	...	..	...	...	...	34·08	...	...	...	37·85	Omagh

SUPPLEMENTARY RAINFALL, NOVEMBER, 1907.

Div.	STATION.	Rain inches	Div.	STATION.	Rain. inches
II.	Abinger Hall	2·91	XI.	Rhayader, Tyrmynydd	3·81
,,	Ramsgate	1·97	,,	Lake Vyrnwy	4·57
,,	Hailsham	3·05	,,	Llangyhanfal, Plâs Draw	2·43
,,	Crowborough, Uckfield Lodge	2·98	,,	Criccieth, Talarvor	2·74
,,	Totland Bay, Aston House	2·71	,,	Llanberis, Pen-y-pass	9·84
,,	Emsworth, Redlands	2·54	,,	Lligwy	3·27
,,	Alton, Ashdell	2·88	,,	Douglas, Woodville	3·79
,,	Newbury, Welford Park	3·22	XII.	Stoneykirk, Ardwell House	5·40
III.	Harrow Weald, Hill House.	2·33	,,	Dalry, The Old Garroch	5·53
,,	Oxford, Magdalen College	2·09	,,	Langholm, Drove Road	4·19
,,	Bloxham Grove	1·73	,,	Moniaive, Maxwelton House	3·71
,,	Pitsford, Sedgebrook	2·09	XIII.	N. Esk Reservoir [Penicuick]	1·80
,,	Huntingdon, Brampton	2·65	XIV.	Maybole, Knockdon Farm	3·80
,,	Wisbech, Bank House	2·46	XV.	Campbeltown, Witchburn	4·99
IV.	Southend Water Works	2·16	,,	Inveraray, Newtown	6·95
,,	Colchester, Lexden	1·61	,,	Ballachulish House	9·47
,,	Newport, The Vicarage	2·22	,,	Islay, Eallabus	5·82
,,	Rendlesham	1·83	XVI.	Dollar Academy	2·56
,,	Swaffham	2·58	,,	Loch Leven Sluice	2·67
,,	Blakeney	1·96	,,	Balquhidder, Stronvar	5·53
V.	Bishops Cannings	2·39	,,	Perth, Pitcullen House	1·97
,,	Ashburton, Druid House	5·88	,,	Coupar Angus Station	1·85
,,	Okehampton, Oaklands	3·37	,,	Blair Atholl	2·15
,,	Hartland Abbey	3·27	,,	Montrose, Sunnyside Asylum	2·10
,,	Lynmouth, Rock House	2·78	XVII.	Alford, Lynturk Manse	2·36
,,	Probus, Lamellyn	6·52	,,	Keith Station	1·81
,,	Wellington, The Avenue	...	XVIII.	N. Uist, Lochmaddy	4·53
,,	North Cadbury Rectory	3·26	,,	Alvey Manse	1·98
VI.	Clifton, Pembroke Road	3·11	,,	Loch Ness, Drumnadrochit.	3·12
,,	Ross, The Graig	2·26	,,	Glencarron Lodge	7·11
,,	Shifnal, Hatton Grange	2·28	,,	Fearn, Lower Pitkerrie	2·16
,,	Cheadle, The Heath House.	...	XIX.	Invershin	2·57
,,	Blockley, Upton Wold	1·88	,,	Altnaharra	2·73
,,	Worcester, Boughton Park.	2·16	,,	Bettyhill	1·96
VII.	Market Overton	2·33	XX.	Dunmanway, The Rectory	4·29
,,	Market Rasen	2·13	,,	Cork	3·93
,,	Bawtry, Hesley Hall	2·04	,,	Darrynane Abbey	3·59
VIII.	Neston, Hinderton Lodge	2·58	,,	Glenam [Clonmel]	4·25
,,	Southport, Hesketh Park	2·74	,,	Ballingarry, Gurteen	3·16
,,	Chatburn, Middlewood	3·47	,,	Miltown Malbay	4·59
,,	Cartmel, Flookburgh	5·19	XXI.	Gorey, Courtown House	3·75
IX.	Langsett Moor, Up. Midhope	4·42	,,	Moynalty, Westland	2·68
,,	Scarborough, Scalby	2·62	,,	Athlone, Twyford	2·34
,,	Ingleby Greenhow	3·02	,,	Mullingar, Belvedere	2·59
,,	Mickleton	1·90	XXII.	Woodlawn	3·08
X.	Bardon Mill, Beltingham	1·47	,,	Westport, Murrisk Abbey	...
,,	Ewesley, Fallowlees	2·39	,,	Collooney, Markree Obsy	2·89
,,	Ilderton, Lilburn Cottage	2·03	,,	Mohill	2·57
,,	Keswick, York Bank	5·34	XXIII.	Enniskillen, Portora	2·33
XI.	Llanfrechfa Grange	3·91	,,	Warrenpoint, Summer Hill.	2·39
,,	Treherbert, Tyn-y-waun	6·29	,,	Banbridge, Milltown	2·36
,,	Carmarthen, The Friary	5·13	,,	Belfast, Springfield	2·93
,,	Castle Malgwyn [Llechryd].	3·60	,,	Bushmills, Dundarave	3·67
,,	Plynlimon	7·45	,,	Stewartstown, The Square	2·94
,,	Crickhowell, Ffordlas	3·20	,,	Killybegs	3·74
,,	New Radnor, Ednol	3·38	,,	Horn Head	4·41

METEOROLOGICAL NOTES ON NOVEMBER, 1907.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Temp. for Temperature; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; TS for Thunderstorm; R for Rain; H for Hail; S for Snow.

CAMDEN SQUARE.—Mild, with practically no frost, but in other respects a normal month, and a typical November. Fog was not extremely frequent, but occasionally very dense, particularly on 20th, when, though the fog did not reach the ground, London was enveloped in absolute darkness for several hours during the morning. Mean temp. 45°·6, or 2°·6 above the average. Duration of sunshine 30·6*, and of R 43·6, hours.

CROWBOROUGH.—R 1·18 in. below the average of 36 years, raising the deficiency for the year to 1·35 in. Mean temp. 44°·7, or 1°·5 above the average.

TORQUAY.—Duration of sunshine 65·5* hours, or 4·0 below the average. Mean temp. 48°·8, or 1°·2 above the average.

NORTH CADBURY.—Rather wet, with normal temp. and great humidity. A mulberry tree still retained green leaves on December 2nd.

ROSS.—Gloomy, with much fog but little frost. The temp. was 1°·2 above the average. On 26th the Wye was in flood.

BOLTON.—Remarkably mild till 15th, but afterwards much colder with frequent fogs, especially on 21st and 30th. The duration of sunshine was 25·6* hours, or 1·8 above the average. Mean temp. 43°·0, close to the average.

SOUTHPORT.—Calm generally, S.E. and E. airs predominating. Mean temp. 43°·7, or 0°·3 below the average; the changes from day to day were, however, excessive. Duration of sunshine 53·1 hours, or 6·0 above the average, and of R 70·2 hours. Total R ·50 in. below the average of 35 years.

LILBURN.—Calm, with slight frosts. The outstanding corn was got in before 22nd, when it became rainy till 28th. There was no S except on the Cheviots, which had a slight covering for 10 days.

HAVERFORDWEST.—Mild and damp, with considerable R, but no severe storms. Duration of sunshine 73·5* hours.

ABERYSTWYTH.—Heavy and dull, the atmosphere being saturated with moisture. At times there were high and variable winds, with low but equable temp. On 12th there was a hurricane from W., from about 6 p.m. till about 11 a.m. on 13th, accompanied at times by terrific R.

DOUGLAS.—Mild, seasonable, and unusually quiet until 25th, with many beautiful days. Severe gale from S.E. on 26th and 27th, and T and L on 27th.

DUMFRIES.—Very unsettled. Harvest operations were completed at about the middle of the month, but both grain and straw were seriously damaged.

INVERARAY.—There were many pleasant days, and summer lingered as long as possible. Fine and frosty at the close.

COUPAR ANGUS.—R 1·05 in. below the average, reducing the surplus since January 1st to 2·28 in. Mean temp. 40°·0, or one degree below the average.

ABERDEEN.—Cold and wet and bad for harvest; much of this was still out at the end of the month.

CASTLETOWN.—On the whole a fairly good month, the first part being dry and breezy, and enabling farmers to secure corn crops. Harvest was fairly good with abundance of straw, but rather light ear. Potatoes and turnips were average.

CORK.—R ·50 in. above, and temp. 4°·5 below, the average. T and L on 26th.

DARRYNANE.—Constant but not heavy R, the total being 9 per cent. below the average.

DUBLIN.—Opening mild, the month ultimately proved rather cold, the mean temp. being 44°·6, or 0°·7 below the average of 35 years. Fog occurred on 8 days.

MARKREE.—Although dry, the month was one of low temp., with frost and S, sleet and H, on several occasions.

BANBRIDGE.—R ·44 in. below the average of 45 years.

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* Campbell-Stokes.

Climatological Table for the British Empire, June, 1907.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp.	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Average. Dew Point.	Average. Humidity.	Absolute. Max. in Sun.	Absolute. Min. on Grass.	Total Rain Depth.	Total Rain Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
London, Camden Square	78·0	9	43·9	17	67·0	50·4	50·2	77	123·8	39·9	2·03	19	...
Malta	84·2	13	58·5	9	75·7	63·9	58·7	68	141·0	...	·00	0	2·9
Lagos	89·0	9	71·6	6	84·7	73·7	74·2	84	162·0	67·0	19·39	25	7·9
Cape Town	75·3	8	38·8	6	62·1	47·1	48·3	79	...	...	2·01	9	3·3
Durban, Natal ...	83·5	24	46·3	9	74·4	52·4	...	...	134·4	...	·34	6	1·8
Johannesburg	...	...	...	...	..	...	...	...	...	...	...	...	...
Mauritius	77·3	15	56·1	5	74·7	62·3	61·9	80	138·0	49·0	4·17	16	6·4
Calcutta...	97·0	16	71·2	3	90·9	79·1	77·7	82	153·0	70·3	18·52	16	7·4
Bombay...	93·7	10	75·4	17	88·6	80·0	77·0	79	139·0	72·8	22·49	20	6·7
Madras	107·6	1	74·9	14	100·1	81·5	69·7	60	148·6	73·1	2·80	9	5·6
Kodaikanal	74·7	3	50·9	17	65·5	53·6	50·6	77	147·6	41·7	1·94	15	6·7
Colombo, Ceylon ...	88·2	4	73·4	15	86·2	77·1	74·7	82	148·8	71·0	6·45	19	6·7
Hongkong	89·5	19	71·8	6	84·3	76·4	73·2	80	138·4	...	13·17	17	7·2
Melbourne	72·2	1	30·2	26	56·0	40·7	42·5	81	122·2	23·3	1·17	7	7·1
Adelaide	65·0	4	34·3	27	58·9	45·5	45·7	80	116·0	22·9	2·34	11	6·3
Coolgardie	70·6	8	34·2	15	60·9	44·2	40·7	69	133·9	29·0	·85	13	5·6
Sydney	64·3	2	42·9	29	58·9	48·9	48·2	89	91·9	34·9	9·14	30	7·4
Wellington	58·5	30	33·0	16	51·8	42·4	41·9	81	93·0	26·0	4·29	14	5·9
Auckland	68·0	6	38·0	22	58·1	46·7	44·8	75	115·0	31·0	3·61	10	5·5
Jamaica, Negril Point.	88·9	30	68·2	21	86·7	73·0	72·8	78	...	...	8·20	15	...
Trinidad	92·0	3	67·0	7	83·8	70·8	73·3	82	157·0	60·0	11·01	22	...
Grenada	87·2	10	70·4	6	83·9	74·4	70·9	77	141·0	...	6·10	25	5·1
Toronto	86·8	18	43·9	7	73·7	53·8	...	...	112·3	39·1	2·12	9	4·0
Fredericton	91·0	18	34·0	12	71·1	47·4	...	70	...	...	2·94	9	6·0
St. John's, N.B. ...	75·9	19	38·5	1	62·2	47·7	...	...	...	...	1·60	13	6·5
Victoria, B.C.	78·2	25	43·4	2	...	...	...	...	...	...	·33	5	...
Dawson	87·0	27	31·0	4	71·9	42·5	...	...	...	...	·85	9	6·2

MALTA.—Mean temp. of air 69°·8. Mean hourly velocity of wind 8·4 miles. Bright sunshine 11·5 hours per day.

LAGOS.—5·08 in. of R fell on the 17th.

Mauritius.—Mean temp. of air 0°·2 below, dew point 0°·8, and relative humidity 3·6 per cent. and R 2·12 in. above averages. Mean hourly velocity of wind 2·0 miles below average.

MADRAS.—R 33 per cent. above, temp. above, averages. A dust storm on 10th. L on 6 days; T8 on 5 other days.

KODAIKANAL.—Bright sunshine 133 hours.

COLOMBO.—Mean temp. of air 80°·9 or 0°·2 below, of dew point 0°·5 above, and R 1·55 in. below, averages. Mean hourly velocity of wind 9·3 miles.

HONGKONG.—Mean temp. of air 79°·9. Bright sunshine 181·0 hours. Mean hourly velocity of wind 11·6 miles. R 3·63 in. below, and sunshine 30 hours above, averages.

Adelaide.—Mean temp. of air 1°·3 below, and R ·65 in. below, averages.

Sydney.—Mean temp. of air 0°·5 below, and R 3·72 in. above, averages.

Wellington.—Mean temp. of air 2°·4 below, and R ·71 in. below, averages.

Auckland.—R 1 inch below average. Violent gale 26th—29th, with low barometer.

TRINIDAD.—Rainfall 2·74 in. above 43 years' average.

Symons's

Meteorological Magazine.

No. 504. JANUARY, 1908. Vol. XLII.

THE RAINFALL OF 1907.

THE rainfall of December has proved to be considerably in excess of the average in all parts of the country, so that the year—which at the end of November promised to be a dry one—has turned out to be one of average rainfall. It is too soon as yet to give a very detailed account of the distribution of rain over the country, but a considerable tract round the estuary of the Thames had less than 20 inches, and the line of 25 inches pursues much the same course on the map as it does on a map of average rainfall. The last column of the Table on p. 245 assumes, this month, the form of a table of ratios of annual rainfall to the average of 30 years, and a map has been constructed from these data, and about 40 supplementary stations which it has been possible to obtain averages. When the figures are set out on this map, it is seen that the whole east coast of Great Britain had less than the average fall of rain, the dry strip widening towards the south, and including the south coast to a point west of Brighton. The extreme fringe of the west of Scotland, the Isle of Man, the Lake District, the coasts of Lancashire, Cheshire and North Wales, the coast of South Wales, and the western horn made up of Cornwall, Devon, Somerset and Dorset, were also drier than in an average year; and the dry belts of the east and west met in a narrow strip through Manchester, Sheffield and Lincoln. In three small areas the rainfall was more than 10 per cent. below the average; these were in North Wales and the Wirral peninsula, along the east coast from the Tees to the Wash, and in the east of Kent; but no station showed a greater deficiency than 13 per cent. The portions of Great Britain where the rainfall exceeded the average included nearly the whole of Scotland, the Pennine region, Wales and the Midlands, with an extension southwards to the coast of Hampshire. Apparently only the parts of Scotland south of Oban and west of Edinburgh had an excess greater than 10 per cent.; and in England, except for a patch in the extreme north-west, there were only a narrow strip in the North Midlands and a spot in Hampshire which were as wet. It is rare to see local differences in the intensity

of rainfall so unobtrusive as in 1907. In Ireland, only a little of the north-east had a rainfall which differed from the average by so much as 10 per cent. The rainfall of the north, of part of the west, and of a patch in the south-east, slightly exceeded the average; in the rest of the country it was slightly less than the average.

The general rainfall for the whole of the British Isles comes out as 1 per cent. above the average, which for all practical purposes may be taken as the average, exactly the same as in 1906. The year 1906 was generally considered to be dry and fine, because the holiday months were dry, and 1907 has generally been stigmatised as wet and wretched, probably because in most parts of the country, as in London, there were a great many days with rain, and, perhaps, because a larger proportion of the rain than is usual fell in the daylight hours. Both years, however, practically coincided with the average, a result that has never previously been recorded. This fact is interesting as illustrating a point on which stress has been laid in these pages and in "British Rainfall" for several years, *viz.*, that the sequence of a wet year following two dry years which has held good for the British Isles since 1889 would sooner or later break down, and could not be relied upon as a basis for prediction. It does not follow that there is not a periodicity in the distribution of annual rainfall; but it seems as if the rhythm were just now changing its time. Expressing the difference from the average in percentages, + for wet years and — for dry years, the sequence taken from the Table on p. 171 of "British Rainfall, 1906," runs :—

1889 —10	1892 — 5	1895 — 7	1898 — 2	1901 —11	1904 — 9
1890 — 3	1893 —12	1896 — 6	1899 — 5	1902 —17	1905 —14
1891 + 5	1894 + 5	1897 + 3	1900 + 8	1903 +26	1906 — 1
					1907 + 1

Splitting up the country into large divisions, adopting the mean of the selected stations in each division as giving its general rainfall (which it is safe to do as the stations are nearly equally spaced), and expressing the average by 100 in each case, the result is—

General Rainfall in 1907. Average = 100.

England	Wales	Scotland.	Ireland.	British Isles.
98	101	106	102	101

The monthly incidence of rain is always interesting, for in farming, water-supply, and in all pursuits where rainfall is a determining factor, the way in which the rain falls and the time at which it comes are often more important than the total amount. The table which follows shows concisely how the rainfall of the months varied from their average in the great divisions of the United Kingdom. It is a summary of the monthly percentage column of the detailed tables published regularly in this Magazine :—

	England & Wales.	Scotland.	Ireland.	British Isles.
	per cent.	per cent.	per cent.	per cent.
January.....	55	74	48	58
February ...	78	98	85	84
March.....	71	115	115	91
April	147	118	130	137
May	150	160	**158**	**154**
June	133	**181**	156	149
July	77	73	85	78
August	82	125	90	94
September...	25	37	42	32
October	**154**	129	138	145
November...	86	85	98	88
December ...	134	109	117	125
Year	99	106	102	101

Taking the British Isles together, five months of 1907 were wet and seven dry as compared with the average, and the most prominent features of the year were the very wet three months of spring and early summer and the extremely dry September.

METEOROLOGICAL SERVICE IN JAMAICA.

We learn from Mr. Maxwell Hall that the colonial meteorological service in Jamaica, which has been in abeyance since 1899, has been re-established, and that he has again taken charge of it. We heartily congratulate the Government of Jamaica on this happy event, for although the generosity of the United States Weather Bureau maintained a complete observing station in Kingston from 1898 to 1903, and a less fully equipped station down to date, the recording of local weather is a duty which no government ought to neglect. We gladly quote from the interesting article in the *U.S. Monthly Weather Review* for July, 1907, by Mr. D. T. Maring, who represented the U.S. Weather Bureau at Kingston after the earthquake in January, 1907, the following message from Sir Sydney Olivier, the Governor, to the Legislative Council of Jamaica :—

Honourable Gentlemen,

I have the honour to inform you that I have received a resolution passed by the Jamaica Agricultural Society at their last half-yearly general meeting, inviting the attention of the Government to the need for restoration of the meteorological service in this Island. I have consulted my Privy Council on this subject, and they agree with me in thinking that the time has come when this service should be restored. The meteorological service, which had existed since the year 1880, was, from the urgent necessity for economy, practically abolished in the year 1899, when it was reduced to the compilation of rainfall statistics; and the total abolition of any separate

vote for this latter kind of work occurred in the year 1902, when such work was allotted to the staff of the Island Chemist.

The restoration of the service as it existed for many years would enable us again to have a useful local system of storm warnings, together with complete meteorological returns for the capital of this Island, which, for some years, has had to do without them. It would also enable a revision to be made of the rainfall maps of the Island which were prepared some years ago after twenty years' registration, but which should now be compiled on the results of some forty years' registration. The scheme now proposed would also include a modest time service, whereby the correct time could be notified throughout the Island from the Island telegraph office in Kingston. Other work of a miscellaneous and useful character would from time to time be performed. The chief reason, however, which impels me to suggest to you at this particular time the desirability of the restoration of the weather service is the first one set out above, viz., that we should have an effective system of local storm warnings. At the time of the abolition of the old service, the Island was fortunate in having had recently established in its midst a well-equipped station with a resident staff supported by the United States Government, and the Island benefited by the generosity of that Government. Since then that service has been reduced and the staff withdrawn, and in the public interest a local system of storm warnings seems necessary. The value of such a system is of two kinds—one positive, the issuing of notices of approaching cyclones, and the other negative, the issuiug of notices to dispel false alarms. It has been represented to me that on the occasion of the last cyclone in August, 1903, one firm alone in a seaport town of Jamaica lost in the value of lighters about four times the annual cost of the weather service, which it is stated would have been saved if the old weather service with its system of telegraphic warnings throughout the Island had then been in existence. Doubtless there are other instances of a like nature within the memory of honourable gentlemen. The dispelling of false alarms is also of great value, and is often the means of saving money which would otherwise be needlessly expended.

A resolution will therefore be submitted to you inviting you to vote a sum at the rate of £150 a year for the restoration of the Island Weather Service.

SYDNEY OLIVIER, *Governor.*

King's House, 27th June, 1907.

The service has been re-established at the modest expense of £150 per annum, and the U.S. Weather Bureau has presented the instruments belonging to them and arranged for the mutual exchange of storm warnings, for which in the hurricane season Jamaica is a most valuable centre.

ROYAL METEOROLOGICAL SOCIETY.

THE monthly meeting of this Society was held on Wednesday evening, December 13th, at the Institution of Civil Engineers, Great George Street, Westminster, Dr. H. R. Mill, President, in the chair.

Captain C. H. Ley read a paper on "The possibility of a Topography of the Air, based on Balloon observations with special Theodolites." The author gave the results of his own observations in Herefordshire, in connection with the International balloon ascents which were carried out during the past summer. His method of observing is based on the direct estimation of the range of the balloon from its apparent diameter, as measured by cross threads in a telescope; the range being thus determined, an altitude and azimuth are read, and the position of the balloon fixed and plotted on a map. As a rule, over a hill both the vertical and horizontal velocity increase, but the vertical velocity in greater proportion than the horizontal. On the other hand, over the lower ground, before and after a hill, it appears that a horizontal velocity usually increases faster, or shows a less decrease, than the vertical velocity, especially at the greater heights. The horizontal deflection of the wind, due to the ground, is much more marked when there is less wind, as in anticyclonic conditions, in cyclonic calms, and at low altitudes. In such conditions the general tendency seems to be for the breezes to blow as far as possible along the contours of the ground. In the case of a valley, the line of least resistance is found along the bottom of the valley; and in the case of a ridge this line is along the contours; and a breeze sometimes appears along and below the farther edge of the ridge, in a direction indicative of the general direction of the superimposed current. Horizontal deflection is often accompanied by a collapse of vertical velocity. The author, in conclusion, says the varying topography of the Earth's surface produces disturbances in the atmosphere with effects which are transmitted throughout the lower and middle strata; and that the general effect on a current is to increase its velocity over a hill and decrease it over a valley, and this is especially the case with the vertical velocity. The origin of the phenomena is to be sought in the mechanical effect of obstruction of the lowest stratum, but there are probably various ensuing complications which may accentuate the result. The measurement of these effects can be carried out by a topography of the air made in any locality.

Mr. W. W. Bryant, Mr. C. J. P. Cave, Capt. A. Carpenter, Dr. W. N. Shaw, Mr. E. S. Bruce, Mr. W. Marriott, and the President, took part in the discussion, and Capt. Ley replied.

Mr. R. Strachan also read a paper on "Indications of approaching frost," in which he said that for the purpose of making forecasts the dry and wet bulb thermometers should be noted at or after sunset, or at 9 p.m., and the amount of cloud at the time, and during the forepart of the night, if convenient. The dew-point can be found by reference to hygrometrical tables. When the dew point is at or below 32° frost is in evidence, but may be evanescent, due to a rise of temperature, with a change of wind, rain, or overcast sky. Even when it is above 32°, if the sky is clear it is possible that the temperature on the ground will go low enough for frost to

form. Thus the evening observations should lead to a good idea of what may happen during the night.

The following ladies and gentlemen were elected Fellows of the Society :—Mr. C. A. Allen, Mr. E. Heron Allen, Mr. A. Bailey, Mr. H. J. Bailey, Major W. Alcock Beck, Mr. C. H. Berners, Mr. C. Brown, Miss L. H. Bushell, Mr. C. P. Chambers, Mr. H. R. G. Clarke, Mr. A. Clay, Mr. H. B. Devereux, Mr. T. A. Dickson, Mr. J. Dixon, Mr. J. W. Duncan, Rev. J. C. Fox, Mr. E. Pirie Gordon, Mr. W. Hall, Mrs. Marcus Hare, Mr. J. Hawksley, Assoc. M.Inst. C.E., Mr. A. P. Jenkin, Mr. C. E. Jones, Assoc. M.Inst. C.E., Mr. Owen Jones, Mr. F. D. Kapadia, Mr. L. G. King, Miss I. J. R. Macadam, Mr. W. G. Machin, Mr. P. P. Pennant, Mr. J. E. Petavel, F.R.S., Miss F. Sparks, Mr. A. J. Stephens, Mr. W. S. Strachan, B. Sc., Capt. F. S. Symons, Mr. A. J. Walker, M.A., Mrs. M. Wilkin, Miss E. D. Woodhouse, and Miss J. L. Woodward.

THE CHRISTMAS SNOWSTORM OF 1906 IN EASTERN EUROPE.

"DAS WETTER" for February, 1907, contains a short article by Herr E. G. Edler with reference to snowfall and other meteorological conditions in Bohemia during the last week of 1906. During the night of December 26th snow fell at Wahlburg to the depth of six inches, accompanied by high wind, causing deep drifts. The snowstorm accompanied a barometrie pressure of 28·9 inches, unusually low for Central Europe.

On the 30th more snow fell, and during the ensuing night the temperature fell to 8° F., the sky being clear and the wind south-west, of Beaufort force 3. The storm of the 26th night was due to a small depression with steep pressure gradients over Bohemia, in some way subsidiary to a large and deep one centred over Scandinavia. It is quite likely that this small depression was identical with the deep one which moved south-eastwards across England on the night of December 25th, bringing with it so much deep snow. The enormous quantities of snow that fell in the east of Scotland between the 26th and 27th appear to have been occasioned by small secondary disturbances in connection with the large cyclonic system centred over Scandinavia. It may be noted, as a matter of interest, that Bohemia lies practically within the East-European region of perpetual winter snow, not like England in the West-European region of intermittently snow-covered ground. L. C. W. B.

Correspondence.

To the Editor of Symons's Meteorological Magazine.

THE GREEN FLASH.

My residence at Montego Bay, Jamaica, faced the west, and at an elevation of 160 feet above sea-level it overlooked the bay. The sea horizon was as a rule wonderfully clear and well defined, so much so that stars of the first magnitude, with the aid of a field glass, could be seen to set, or rather to disappear instantly as in occultation.

After the spring equinox last year the sun could be seen to set below the sea horizon, and all the members of my family began to look out for the green flash. The first attempt was a failure; the bright red limb of the setting sun was so strong that we all saw green wherever else we looked, and our sight was dimmed at the critical moment.

Next evening we each had a card in which a pin-hole had been made, and what we saw that evening we could always see again during the three weeks the observations were continued.

Looking through the pin-hole, as the limb of the sun was about to disappear, it was seen to form a short, thin red line; suddenly this line was transformed into a bright red star, which remained red for about three seconds; then the colour suddenly changed from red to green, and remained so for about half a second, when it suddenly vanished.

Children and all saw the change of colour at the same instant of time; the cry of "There!" was simultaneous.

I was not able to go on with magnifying power and dark glasses simply because I was transferred from Montego Bay to Chapelton; and it appears that it would have been quite unnecessary, as Dr. Rambaut has done all that is required.

The effect is certainly due to the dispersion of the atmosphere, as Dr. Rambaut has explained in these pages last year; and my trivial device may be a source of amusement to many who have a clear sea horizon to the west.

MAXWELL HALL,

Jamaica, Dec. 11th, 1907. *Govt. Meteorologist.*

NOTES ON 1907.

The wettest day in each of the twelve months of 1907 occurred at Upton as follows:—

1st, 1st, 2nd, 2nd.....	of month.
11th, 11th, 12th, 12th, 14th.....	,,
21st	,,
25th, 26th	,,

(but not in the *sequence* given above). It will be noticed that on

four occasions the 1st—2nd of month occur, and on *five* occasions the 11th—14th.

Another feature of 1907 may be noted, the equability of temperature during the year. The highest was 78½° F. and the lowest was 21¼° in the screen. Days over 80° F. in the nine previous years (here) were, beginning with 1898: 19, 31, 23, 19, 9, 6, 14, 14, 21. Next comes the year 1907, *nil.*

The extraordinary mildness of December last will doubtless be referred to by other contributors.

RICHARD BENTLEY.

Upton, Slough, Bucks.

WANTED! A NAME.

In regard to "A.B.M.'s" letter I need hardly say that it is extremely difficult to change a name grown familiar by long usage. It is also, in some respects, inexpedient, though the name may not be appropriately expressive. I am afraid that however desirable it may seem, "meteorology" will long continue to represent the "science of the weather."

Even if a suitable substitute were found its general acceptance could not be ensured, and it would probably soon be dropped to revert to the older designation. In any case to alter a long-standing appellation would obviously cause confusion, besides bringing about more trouble and misunderstanding than the change was intended to avoid.

Various misnomers or badly-applied names could be quoted in several departments of science or as given to phenomena which they do not correctly express or imply. Thus in astronomy an "eclipse of the sun" is properly an "occultation of the sun," as the word eclipse is usually applied to an event where one celestial body is obscured by passing through the shadow of another, or during a lunar eclipse when the moon travels through the Earth's shadow. But there is little likelihood that the term "eclipse of the sun" will ever be put aside for one considered more applicable, for the ancient title is well understood if it is not accurate in a technical sense.

I am not an advocate for the retention in perpetuity of any inapt titles or misnomers where substantial reason can be assigned for change, but I think that in general it is best to preserve old names, for

"Time doth consecrate,
And what is grey with age becomes religion."

W. F. DENNING.

"SHADE" TEMPERATURE.

I recently had occasion to make a comparison of the maximum and minimum temperatures registered in (A) a verandah facing north, and (B) a Stevenson screen. The thermometers were by the best

makers, with Kew certificates, and were carefully compared by being hung side by side in the verandah on a wooden trellis five inches distant from the wall. The maxima were recorded continuously from September 15th to October 6th, and gave the means:

A .. ... 63°·6 B ..... 65°·7

The greatest differences were on

Sept. 24th ..... A ..... 65°·2 B ..... 69°·4
,, 25th ..... A ..... 70°·0 B ..... 74°·0

On one occasion only was A higher than B, viz., September 29th, when A was 60°·5 and B 60°·2.

The minima from September 19th to October 8th gave means:

A ..... 51°·7 B ..... 50°·7

The greatest difference was on October 5th:

A ..... 44°·0 B ..... 42°·1

B was never as high as A.

To summarize: the temperature in a verandah facing north and shielded from lateral sunshine is about 2° lower in the daytime and 1° higher at night. The latter is perhaps due to radiation from the wall of the house.

ALFRED O. WALKER.

Ulcombe Place, nr. Maidstone, Dec. 22nd, 1907.

THE GREENWICH OBSERVATIONS.

A CORRESPONDENT points out that the notice of the last annual report of the meteorological work at the Royal Observatory at Greenwich, on p. 219, contained some expressions that might give rise to misconceptions in the minds of some readers, and, while experience has convinced us that no form of words can be devised which can altogether exclude the possibility of misconception, we are always ready to try to correct any wrong ideas that may be suggested, however unwittingly, by anything which appears in these pages.

Our correspondent says that the reference to the different hours of observations on Sundays seems to him to give the impression that the Sunday results are less reliable than those of other days, which he says is not the case. The daily results for all days, as regards pressure and wet and dry bulb temperatures, are based on 24 hourly measurements of the photographic trace of the recording instruments, the eye observations being used simply to reduce the photographic records to the values of the standard instruments. The maximum and minimum temperatures are given for all days, Sundays included; and the omission of the Sunday observations at certain hours of the day in the case of the subsidiary thermometers in various positions is no great loss, as the weekday observations suffice to show the sort of variation that exists in the daily differences.

We understand that a deep-rimmed rain gauge, of the Meteor-

ological Office pattern, is being added to the existing rain gauges at the Royal Observatory for comparison with them

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We find on reference to the volume of Hourly Observations at the Observatories under the Meteorological Office, noticed on p. 219, that we, and not the Stationery Office, made a mistake, as there are 12 monthly parts at 6d. for each of the four Observatories, and not merely 12 monthly parts as we had rashly assumed.

REVIEWS.

Air Currents and the Laws of Ventilation. Lectures on the Physics of the Ventilation of Buildings, delivered in the University of Cambridge, in the Lent Term, 1903. By W. N. SHAW, Sc.D., F.R.S., Honorary Fellow of Emmanuel College; Director of the Meteorological Office Cambridge, at the University Press, 1907. Size $8\frac{1}{2} \times 5\frac{1}{2}$. Pp. xii.+94.

THIS little book abounds in novelty of presentation, the most striking instance being the way in which the author works out the theory of ventilation on the analogy of electricity, and so assigns quantitative values to the movement of air in buildings with relation to the size of orifices and the strength of currents. The book is thus of great scientific and practical interest. Dr. Shaw says that it is, in a way, his last will and testament in respect of ventilation, for "the requirements of the study of the processes of ventilation on the larger scale, as they are exhibited in the weather, no longer permit me to work out these interesting, but complicated problems."

Handbuch der Ozeanographie von DR. OTTO KRÜMMEL. *Band I. Die räumlichen, chemischen und physikalischen Verhältnisse des Meeres.* [Handbook of Oceanography by Dr. Otto Krümmel. Vol. I. The dimensional, chemical and physical conditions of the Sea.] Stuttgart: Engelhorn, 1907. Size 9 × 6. Pp. xvi. + 526. Price 22 marks.

PROFESSOR KRÜMMEL, who fills the Chair of Geography in the University of Kiel, and has been for many years the leading German exponent of oceanography, has produced what is nominally a new edition of the first volume of the Handbook of Oceanography, written some years ago by Professor G. von Boguslawski and himself, but really it is a new work, entirely re-written and based upon the accumulated records of oceanographical research down to the latest date. While the whole question of the physics of the ocean lies close to that of the physics of the atmosphere, and no part of the science of the sea can be held alien by the student of the air, the part of this book which most directly concerns us in this place is

the short section on the relations between air and water temperature, a matter to which Professor Krümmel has given particular attention. He shows that the surface of the sea is in general warmer than the overlying air, and to such an extent is this the case in winter, that the warm Atlantic water entering the Baltic on a cold day often steams so strongly that the columns of condensed vapour resemble waterspouts, and give rise to showers of powdery snow. Over cold currents, however, the air may remain warmer than the water for many months together. Professor Krümmel deals with the whole of his wide subject with a firm hand, and in an interesting style.

Note on the Connection between Rainfall at Durban and Mauritius. By T. F. CLAXTON, F.R.A.S. Reprint from *Trans.* South African Philosophical Society, Vol. **16**, Pt. 5. June, 1907. Size, 10 × 6½. Pp. 6.

MR. T. F. CLAXTON, as the first results of an inquiry into the possibility of drawing up seasonal weather forecasts for the island of Mauritius, shows by a comparison of observations made at Durban with those at ten stations scattered over the island of Mauritius during the years 1873–1904, that winter droughts at Durban have invariably been followed by summer droughts in Mauritius; also that prolonged droughts in Natal, or those commencing in summer, have been either accompanied or followed by prolonged droughts in Mauritius. The interval between the winter droughts at Durban and the summer droughts at Mauritius is from three to seven months, and appears to depend on the time of commencement of the former. No relation, however, is apparent between the interval, duration and intensity of the Mauritius summer droughts with the duration and intensity of the Natal winter ones. Mr. Claxton regrets that he was unable to avail himself of observations from other places in Natal besides Durban. A point of interest noted by him, is that the Durban winter droughts are not necessarily followed by an absence in summer of cyclones in the neighbourhood of Mauritius, and that the summer droughts of Mauritius are related to the non-cyclonic type of rainfall. L.C.W.B.

The Science Year Book and Diary for 1908. (Fourth year of issue.) Edited by MAJOR B. F. S. BADEN-POWELL. London: King, Sell and Olding. Size, 9 × 5.

THIS convenient and useful combination of book of reference and diary continues to improve with each successive issue. The Editor asks for suggestions for further improvement, and we agree with his own suggestion in the preface, that more detailed summaries of the scientific progress of the previous year would be a welcome addition.

Report of Committee appointed to enquire whether earlier warning of the Typhoon of September 18th, 1906, could have been given to shipping, Hongkong, 1906. Size, $13\frac{1}{2} \times 9$. Pp. 60.

REFERENCE was made to the appointment of this Committee in the Magazine for October, 1906 (Vol. 41, p. 171), and we are happy now to give the substance of the report as submitted to Sir Matthew Nathan, Governor of Hongkong, by the Committee consisting of Sir Henry S. Berkeley, K.C., Lieut. H. Butterworth, R.N., Mr. A. B. Skottowe of the Eastern Extension Telegraph Company, and Captain A. Sommerville.

The Committee met on the 24th of September, 1906, as well as on several subsequent occasions; although not invested with power to compel the attendance of witnesses, it invited ship-masters and others likely to possess information to assist in the enquiry. The evidence taken by the Committee is appended to the report. The Shanghai Observatory on the 18th, after the storm published the following:—"A very violent storm of quite limited area raged in Hongkong on Tuesday morning" (18th). At 8 a.m. on the 18th an order to hoist the Black Drum was issued from the Hongkong Observatory, indicating the existence of a typhoon at a distance within 300 miles from the colony. The Committee were of opinion that the barometric observations noted in the report did not call for the hoisting of any typhoon signal in Hongkong on the 17th of September. Evidence as to the general appearance of the weather on the morning of the 18th, prior to the hoisting of the Black Drum, was conflicting. Summing up the whole evidence, the Committee found that before 7.44 a.m. on the 18th there were no signs of the approach to Hongkong of a typhoon; and that warning, by the hoisting of the Black Drum, was given as soon as was practically possible.

From the evidence annexed to the report, it appears that the area of the storm was small. Thus, while at 10 a.m. the storm at Hongkong had reached its greatest fury with a south-west wind of force 11, at Macao, about 36 miles away, the wind was north of force 1. Captain Hooker, of the China Navigation Company's s.s. "Kwei Chow," recorded by his typhoon barometer a decrease of pressure out at sea amounting to an inch in an hour and a half.

The pressure chart for 6 a.m., September 18th, 1906, issued by the Zi-Ka-Wei Observatory of the China Weather Service, shows that an anticyclonic area lay to the north of China, and that a low-pressure area favourable for typhoon development embraced the neighbourhood of Hongkong.

The typhoon, it will be remembered, was a disastrous one, and the following meteorological observations recorded at Hongkong Observatory while it was raging on the morning of the 18th may be of interest:—

Hours.	Barometer reduced to sea level.	Temp.	Wind.		Clouds.
			Direction.	Force.	
7 a.m...	29·698 in.	77°·3 F.	N.W.	3	10 nimbus N.N.W.
8 ,, ...	·604 ,,	76°·8 ,,	N.W.	5	—
9 ,, ...	·394 ,,	—	W. by N.	10	—
10 ,, ...	·275 ,,	75°·0 ,,	S.W.	10–11	10 nimbus.
11 ,, ...	·633 ,,	—	S.	6	—
12 ,, ...	·703 ,,	77°·1 ,,	S.S.W.	4–7	10 nimbus S.S.W.
1 p.m...	·767 ,,	78°·5 ,,	S.	3	—

L. C. W. B.

Discussion of the Errors of certain types of Minimum Spirit Thermometers in use at the Royal Alfred Observatory, Mauritius. By B. A. WALTER, F.R.A.S., Chief Assistant. From *Trans.* S. African Phil. Soc., **16** (1907), Part 5). Size, 10 × 6½. Pp. 18.

DESCRIPTION of an elaborate series of experiments devised to account for the discrepancies observed between the minimum as recorded by a photographic thermograph and an ordinary minimum thermometer. The practical conclusion arrived at by Mr. Walter is that no spirit thermometer with a spherical bulb should be allowed in the equipment of a meteorological observatory, as by reason of their sluggishness such thermometers always give too high a minimum, sometimes by as much as 3° F. We entirely concur in this conclusion; our own observations with different patterns of spirit thermometers leading us to view the spherical-bulb instrument as practically useless, at least as a minimum on grass.

Report of the Chief of the Weather Bureau for 1907, by WILLIS L. MOORE, *U.S. Department of Agriculture.* Washington, 1907. Size, 9 × 6. Pp. 56.

AN official report commencing "Americans take pride," shows that the work being reported on is going forward with confidence and a light heart. They take pride, it goes on to say, "in the pioneer work that Lieutenant Maury, the naval meteorologist, did," and that pioneer work is being continued with an energy and enthusiasm that are altogether admirable. American meteorologists are proud of their past, and not so much hopeful as certain of their future. What European official would write in such a strain as follows?

"A research observatory has been created at Mount Weather, Va., and a staff of highly trained and ambitious young men has been

formed. The first important result achieved by this staff was the sending of meteorological instruments by means of aeroplanes to greater altitudes than has to our knowledge been accomplished elsewhere. The observations thus obtained have been continued for over three months in succession, practically without interruption, and it is probable that such record will be maintained indefinitely in the future."

On October 3rd, 1907, observations were made by means of aeroplane at 23,111 feet above sea level, and "the world's record for the securing of observations high in the air was broken." Free balloons with meteorographs are to be used in large numbers for the purpose of exploring the atmosphere up to 10 miles, and a strong effort is being made to apply upper air results in forecasting weather.

All the other departments of the work, special investigations of evaporation of the Salton Lake, radiation experiments, wireless telegraphy, teaching of meteorology and the like, are dealt with in the same spirit, and this healthy and optimistic report winds up with "Increase in Salaries."

Ceylon. Administration Reports, 1906. *Part IV. Education, Science and Art; Meteorology. Report of the Surveyor-General.* Size 13 × 8. Pp. 52. Plates.

A FULL account of the meteorological observations in Ceylon during 1906, illustrated by diagrams, rainfall maps of the months and of the year, the latter indicating the direction and force of the wind, and with an interesting plate showing tea-leaves bruised and perforated by hail.

METEOROLOGICAL NEWS AND NOTES.

THE PORTRAIT OF DR. ALEXANDER BUCHAN which, by the kindness of Mr. John Thomson, we are enabled to reproduce as a frontispiece to this volume, is a very faithful presentment of the striking personality of the distinguished meteorologist, a sketch of whose career will be found on pp. 103–106.

DR. H. R. MILL is to give a course of six lectures on the Geographical Distribution of Rainfall in the British Isles, under the auspices of the Royal Geographical Society, at the Theatre, Burlington Gardens, on Thursdays, at 6 p.m., commencing on January 23rd and continuing weekly. Full particulars may be obtained on application to the Chief Clerk, Royal Geographical Society, 1, Savile Row, London, W.

MR. GOLD, THE LECTURER ON METEOROLOGY in the University of Cambridge, begins a course of eight lectures in the Cavendish Laboratory on January 16th. Lectures I. to IV. will deal with the Thermo-dynamics of the Atmosphere, and Lectures V. to VIII. with

Atmospheric Motion. The syllabus of the course promises well for original handling of data which have not yet become the commonplaces of text-books.

THE STUDY OF WEATHER AS A BRANCH OF NATURE KNOWLEDGE is treated in an admirable article by Miss Marion Newbigin, D.Sc., in the *Scottish Geographical Magazine* for December, 1907, being a lecture which she had delivered to teachers in Aberdeen and in Edinburgh. She strongly commends meteorology as a branch of Nature study in schools.

AVAILABLE DAYLIGHT may be measured by the number of hours between sunrise and sunset during which we are awake and about. The proverbial healthiness and wisdom of "early to bed and early to rise" depend on the increase of the available daylight, and an ingenious plan to enable everyone to find these boons unconsciously has been put forward by Mr. Wm. Willett. It consists in a compulsory putting back of all official clocks, so as to make the nominal day begin earlier in the summer months, so that the world will go to work soon after sunrise and leave a large surplus of daylight for enjoyment after work hours. The suggestion is admirable, and would work perfectly under an ideal despotism; but, except at sea, where it is the order of the day in order to keep the meridians straight, we fear the inherent conservatism of the British people would never sanction so revolutionary a proceeding. From the point of view of scientific work, of course the displacement of 12 o'clock from mean noon could not be contemplated, but if a neatly-phrased alternative system of time-keeping could be arrived at we should greatly enjoy the 210 extra hours of sunshine, or at least of daylight, in the waking year.

THE INTERIOR OF THE EARTH MAY INFLUENCE CLIMATE in the opinion of Prof. John Milne, who in his report on Seismology to the Leicester meeting of the British Association, pointed out that there was evidence in the luminous appearance sometimes seen on cliffs or quarry walls of radio-active or electric emanations from the solid substance of the Earth, and, if such exist, it is very unlikely that they do not affect the climate. At present the supposed effect is purely hypothetical, and there is no foundation for the positive statements in some newspapers that weather is made in the Earth's crust.

Erratum.—Our attention has been called to a stupid blunder in the heading of the Climatological Table for the British Empire, on the last page of each number of this Magazine, from April to October, 1907, where the column of "Absolute" extremes refers to "Max. on grass," in place of "Min. on grass." The obviousness of the blunder makes it the less harmful, but how it should have been passed so long in proof-reading is one of the problems that puzzle an Editor.

TEMPERATURE FOR DECEMBER, 1907.

STATION.	COUNTY.	Lat. N.	Long. W. [*E.]	Height above Sea. ft.	TEMPERATURE. Max.		TEMPERATURE. Min.		No. of Nights at or below 32° Shade.	No. of Nights at or below 32° Grass.
		° ′	° ′		°	Date.	°	Date.		
Camden Square	*London*	51 32	0 8	111	57·0	8	29·9	16	2	12
Tenterden	*Kent*	51 4	*0 41	190	58·0	8	30·0	16	7	15
West Dean	*Hampshire*	51 3	1 38	137	56·0	8	26·0	6	10	18
Hartley Wintney	,,	51 18	0 53	222	55·0	8, 9, 10	28·0	6, 7	10	19
Hitchin	*Hertfordshire*	51 57	0 17	238	56·0	8	28·0	15‖	...	13
Winslow (Addington)	*Buckinghamshr.*	51 58	0 53	309	54·0	8	28·0	30	13	17
Bury St. Edmunds (Westley)	*Suffolk*	52 15	*0 40	226	55·0	8	26·0	24	16	...
Brundall	*Norfolk*	52 37	*1 26	66	56·4	8	26·2	16	8	22
Winterbourne Steepleton	*Dorset*	50 42	2 31	316	54·4	8	29·3	6	7	11
Torquay (Cary Green)	*Devon*	50 28	3 32	12	57·2	8	33·5	29	0	3
Polapit Tamar [Launceston]	,,	50 40	4 22	315	56·0	8	28·2	30	4	12
Bath	*Somerset*	51 23	2 21	67	57·0	8	29·0	6, 30	8	...
Stroud (Upfield)	*Gloucestershire*	51 44	2 13	226	51·0	8	27·0	28, 29	10	...
Church Stretton (Wolstaston)	*Shropshire*	52 35	2 48	800	52·5	8	24·0	29	15	...
Coventry (Kingswood)	*Warwickshire*	52 24	1 30	340	47·0	19	31·0	28, 30	3	...
Boston	*Lincolnshire*	52 58	0 1	25	52·0	8	29·0	16	12	...
Worksop (Hodsock Priory)	*Nottinghamshire*	53 22	1 5	56	55·0	8	25·4	24	11	25
Derby (Midland Railway)	*Derbyshire*	52 55	1 28	156	54·0	8, 20	26·0	30	13	...
Bolton (Queen's Park)	*Lancashire*	53 35	2 28	390	51·7	8	29·6	1	9	19
Wetherby (Ribston Hall)	*Yorkshire, W.R.*	53 59	1 24	130	...	...	...	...	...	...
Arncliffe Vicarage	,, ,,	54 8	2 6	732	...	...	...	...	...	...
Hull (Pearson Park)	,, *E.R.*	53 45	0 20	6	54·0	8	25·0	24	5	19
Newcastle (Town Moor)	*Northumberland*	54 59	1 38	201	...	...	...	...	...	...
Borrowdale (Seathwaite)	*Cumberland*	54 30	3 10	423	52·5	7	28·4	15	7	...
Cardiff (Ely)	*Glamorgan*	51 29	3 13	53	...	...	...	...	...	...
Haverfordwest (High Street)	*Pembroke*	51 48	4 58	95	54·5	9	26·7	29	7	10
Aberystwyth (Gogerddan)	*Cardigan*	52 26	4 1	83	54·0	20, 21	20·0	28	...	...
Llandudno	*Carnarvon*	53 20	3 50	72	55·0	4	32·2	27	0	...
Cargen [Dumfries]	*Kirkcudbright*	55 2	3 37	80	52·0	19	24·0	1	10	...
Lilliesleaf (Riddell House)	*Roxburgh*	55 31	2 46	550	...	...	...	...	...	...
Edinburgh (Royal Observy.)	*Midlothian*	55 55	3 11	442	48·8	8, 22	30·1	30	7	15
Girvan (Pinmore)	*Ayr*	55 10	4 49	207	50·0	7†	23·0	15	12	12
Glasgow (Queen's Park)	*Renfrew*	55 53	4 18	144	50·0	19	25·0	1	6	26
Tighnabruaich	*Argyll*	55 55	5 14	50	44·0	18	27·0	14	16	17
Mull (Quinish)	,,	56 36	6 13	35	52·0	13	...	...	...	...
Dundee (Eastern Necropolis)	*Forfar*	56 28	2 57	199	47·5	17	26·0	1	9	...
Braemar	*Aberdeen*	57 0	3 24	1114	...	...	...	...	...	...
Aberdeen (Cranford)	,,	57 8	2 7	120	48·0	2‡	24·0	29	14	...
Cawdor	*Nairn*	57 31	3 57	250	...	...	...	...	...	...
Invergarry	*E. Inverness*	57 4	4 47	130?	...	...	...	...	...	...
Loch Torridon (Bendamph)	*W. Ross*	57 32	5 32	20	...	...	...	...	...	...
Dunrobin Castle	*Sutherland*	57 59	3 56	14	50·5	17	28·5	30	11	...
Castletown	*Caithness*	58 35	3 23	100	50·0	17	27·0	8§	22	24
Killarney (District Asylum)	*Kerry*	52 4	9 31	178	56·0	8	29·5	29	...	...
Waterford (Brook Lodge)	*Waterford*	52 15	7 7	104	53·0	16	27·0	6	7	...
Broadford (Hurdlestown)	*Clare*	52 48	8 38	167	48·0	16, 19	28·0	6¶	13	...
Abbey Leix (Blandsfort)	*Queen's County*	52 56	7 17	532	53·0	19	23·0	5**	...	13
Dublin (Fitz William Square)	*Dublin*	53 21	6 14	54	54·8	20	31·0	15	1	9
Ballinasloe	*Galway*	53 20	8 15	160	53·0	7	23·0	24	21	...
Clifden (Kylemore House)	,,	53 32	9 52	105	...	...	...	...	...	...
Crossmolina (Enniscoe)	*Mayo*	54 4	9 18	74	...	...	...	...	...	...
Seaforde	*Down*	54 19	5 50	180	52·0	7	28·0	6††	10	16
Londonderry (Creggan Res.)	*Londonderry*	54 59	7 19	320	...	...	...	...	...	...
Omagh (Edenfel)	*Tyrone*	54 36	7 18	280	...	...	...	...	...	...

† and 19, 20. ‡ and 17, 22. ‖ and 23, 24. § and 30, 31. ¶ and 28, 31. ** and 22, 28. †† and 14, 24.

RAINFALL FOR DECEMBER, 1907.

RAINFALL OF MONTH.							RAINFALL FROM JAN. 1.					
Aver. 1870-99.	1907.	Diff. from Av.	% of Av.	Max. in 24 hours.		No. of Days	Aver. 1870-99.	1907.	Diff. from Aver.	% of Av.	Mean Annual 1870-1899.	STATION.
				in.	Date.							
in.	in.	in.					in.	in.	in.		in.	
2·12	3·79	+1·67	178	·72	12	16	25·16	23·01	— 2·15	91	25·16	Camden Square
2·74	2·78	+ ·04	101	·47	13	16	28·36	24·86	— 3·50	88	28·36	Tenterden
2·74	4·32	+1·58	158	·95	2	20	29·93	29·28	— ·65	98	29·93	West Dean
2·55	3·68	+1·13	144	·70	11	17	27·10	27·46	+ ·36	101	27·10	HartleyWintney
2·05	3·26	+1·21	159	·85	4	14	24·66	24·51	— ·15	99	24·66	Hitchin
2·27	3·79	+1·52	167	·79	4	21	26·75	25·54	— 1·21	95	26·75	Addington
2·11	3·05	+ ·94	144	·64	13	16	25·39	24·78	— ·61	98	25·39	Westley
2·13	2·60	+ ·47	122	·64	13	20	25·40	25·41	+ ·01	100	25·40	Brundall
4·13	5·53	+1·40	134	·82	11	26	39·00	39·27	+ ·27	101	39·00	Winterbourne Stpltn
3·46	4·37	+ ·91	126	·65	2	28	35·00	33·22	— 1·78	95	35·00	Torquay
4·39	6·48	+2·09	148	1·33	4	25	38·85	38·14	— ·71	98	38·85	Polapit Tamar
2·76	4·80	+2·04	174	1·04	4	21	30·75	32·33	+ 1·58	105	30·75	Bath
2·48	5·01	+2·53	202	·90	4	17	29·85	31·60	+ 1·75	106	29·85	Stroud
2·92	3·83	+ ·91	131	·68	4	21	33·04	36·00	+ 2·96	109	33·04	Wolstaston
2·44	3·36	+ ·92	138	·64	4	15	29·21	29·28	+ ·07	100	29·21	Coventry
1·79	2·41	+ ·62	135	·66	4	16	23·30	22·36	— ·94	96	23·30	Boston
2·02	2·37	+ ·35	117	·90	12	19	24·70	23·66	— 1·04	96	24·70	Hodsock Priory
2·28	2·85	+ ·57	125	·52	13	22	26·18	28·38	+ 2·20	108	26·18	Derby
4·19	4·59	+ ·40	110	·61	7	22	42·43	45·56	+ 3·13	107	42·43	Bolton
2·19	2·76	+ ·57	126	·60	7	18	26·96	29·44	+ 2·48	109	26·96	Ribston Hall
6·41	8·99	+2·58	140	1·24	19	24	60·96	63·30	+ 2·34	104	60·96	Arncliffe Vic.
2·36	2·55	+ ·19	108	·48	13	23	27·02	24·82	— 2·20	92	27·02	Hull
2·64	3·06	+ ·42	116	·57	13	24	27·99	27·33	— ·66	98	27·99	Newcastle
14·70	19·13	+4·43	130	2·85	13	20	132·68	128·81	— 3·87	97	132·68	Seathwaite
4·43	7·54	+3·11	170	1·33	4	24	42·81	42·32	— ·49	99	42·81	Cardiff
5·22	4·26	— ·96	82	·65	7	22	47·88	44·17	— 3·71	92	47·88	Haverfordwest
4·49	4·59	+ ·10	102	·56	7†	21	45·41	47·05	+ 1·64	104	45·41	Gogerddan
2·95	2·14	— ·81	73	·43	9	18	30·98	26·31	— 4·67	85	30·98	Llandudno
4·68	5·53	+ ·85	118	1·22	19	14	43·43	49·29	+ 5·86	114	43·43	Cargen
3·18	...	...	...	...	...	...	33·04	...	...	...	33·04	Riddell House
...	3·77	...	...	1·18	13	17	...	30·19	...	...	...	Edinburgh
5·24	5·49	+ ·25	105	·68	7	23	48·87	57·67	+ 8·80	118	48·87	Girvan
3·53	5·58	+2·05	158	·78	20	20	35·80	42·23	+ 6·43	118	35·80	Glasgow
6·33	7·51	+1·18	119	1·03	7	22	57·90	64·37	+ 6·47	111	57·90	Tighnabruaich
6·48	7·02	+ ·54	108	·93	4	20	57·53	55·06	— 2·47	96	57·53	Quinish
2·73	3·55	+ ·82	130	·95	13	26	28·95	31·40	+ 2·45	108	28·95	Dundee
3·15	2·56	— ·59	81	...	...	...	36·07	31·53	— 4·54	87	36·07	Braemar
3·39	3·77	+ ·38	111	1·07	13	18	33·01	32·87	— ·14	100	33·01	Aberdeen
2·53	1·65	— ·88	65	·46	13	8	29·37	30·54	+ 1·17	104	29·37	Cawdor
6·67	8·66	+1·99	130	1·25	9	19	56·00	61·29	+ 5·29	109	56·00	Invergarry
9·04	9·30	+ ·26	103	1·38	4	22	86·50	91·11	+ 4·61	105	86·50	Bendamph
3·39	2·81	— ·58	83	·78	13	14	31·60	32·17	+ ·57	102	31·60	Dunrobin Castle
...	3·03	...	...	·60	13	26	...	31·20	...	...	...	Castletown
6·64	8·31	+1·67	125	·91	3	28	58·11	46·98	—11·13	81	58·11	Killarney
4·31	5·38	+1·07	125	·71	19	25	39·30	39·89	+ ·59	102	39·30	Waterford
3·37	4·42	+1·05	131	·50	19	28	33·47	37·47	+ 4·00	112	33·47	Hurdlestown
3·48	4·07	+ ·59	117	·68	19	26	35·19	38·03	+ 2·84	108	35·19	Abbey Leix
2·39	2·15	— ·24	90	·49	19	22	27·75	26·99	— ·76	97	27·75	Dublin
3·63	4·22	+ ·59	116	1·01	19	25	37·04	37·24	+ ·20	101	37·04	Ballinasloe
8·99	11·01	+2·02	122	·90	17	24	80·23	74·51	— 5·72	93	80·23	Kylemore House
5·81	7·94	+2·13	137	1·30	17	28	50·50	53·81	+ 3·31	107	50·50	Enniscoe
3·64	3·71	+ ·07	102	·65	7	23	38·61	39·93	+ 1·32	103	38·61	Seaforde
4·31	4·30	— ·01	100	·63	10	23	41·20	47·16	+ 5·96	114	41·20	Londonderry
3·77	...	...	...	...	...	...	37·85	...	...	...	37·85	Omagh

† and 10, 13.

SUPPLEMENTARY RAINFALL, DECEMBER, 1907.

Div.	STATION.	Rain inches	Div.	STATION.	Rain. inches
II.	Abinger Hall	4·49	XI.	Rhayader, Tyrmynydd	6·55
,,	Ramsgate	1·60	,,	Lake Vyrnwy	7·89
,,	Hailsham	3·44	,,	Llangyhanfal, Plâs Draw....	2·19
,,	Crowborough, Uckfield Lodge	4·42	,,	Criccieth, Talarvor	3·33
,,	Totland Bay, Aston House.	3·02	,,	Llanberis, Pen-y-pass	...
,,	Emsworth, Redlands	3·37	,,	Lligwy	3·14
,,	Alton, Ashdell	4·65	,,	Douglas, Woodville	5·35
,,	Newbury, Welford Park ...	5·93	XII.	Stoneykirk, Ardwell House	4·28
III.	Harrow Weald, Hill House.	3·34	,,	Dalry, The Old Garroch ...	7·66
,,	Oxford, Magdalen College..	3·74	,,	Langholm, Drove Road	7·03
,,	Bloxham Grove	3·74	,,	Moniaive, Maxwelton House	6·19
,,	Pitsford, Sedgebrook	3·60	XIII.	N. Esk Reservoir [Penicuick]	3·50
,,	Huntingdon, Brampton	3·28	XIV.	Maybole, Knockdon Farm..	4·48
,,	Wisbech, Bank House	2·73	XV.	Campbeltown, Witchburn...	5·57
IV.	Southend Water Works	2·44	,,	Inveraray, Newtown	8·72
,,	Colchester, Lexden	2·48	,,	Ballachulish House	11·29
,,	Newport, The Vicarage	3·00	,,	Islay, Eallabus	6·08
,,	Rendlesham	2·64	XVI.	Dollar Academy	6·58
,,	Swaffham	2·53	,,	Loch Leven Sluice	4·64
,,	Blakeney	2·84	,,	Balquhidder, Stronvar	9·06
V.	Bishops Cannings	4·16	,,	Perth, Pitcullen House	4·29
,,	Ashburton, Druid House ...	7·94	,,	Coupar Angus Station	3·72
,,	Okehampton, Oaklands	7·70	,,	Blair Atholl	3·26
,,	Hartland Abbey	5·37	,,	Montrose, Sunnyside Asylum	3·47
,,	Lynmouth, Rock House ...	7·51	XVII.	Alford, Lynturk Manse ...	3·63
,,	Probus, Lamellyn	4·90	,,	Keith Station	1·98
,,	Wellington, The Avenue ...	...	XVIII.	N. Uist, Lochmaddy	...
,,	North Cadbury Rectory ..	4·71	,,	Alvey Manse	1·84
VI.	Clifton, Pembroke Road ...	6·28	,,	Loch Ness, Drumnadrochit.	2·93
,,	Ross, The Graig	3·71	,,	Glencarron Lodge	8·52
,,	Shifnal, Hatton Grange	2·42	,,	Fearn, Lower Pitkerrie	2·34
,,	Cheadle, The Heath House.	...	XIX.	Invershin	3·58
,,	Blockley, Upton Wold	4·07	,,	Altnaharra	3·16
,,	Worcester, Boughton Park.	3·81	,,	Bettyhill	2·40
VII.	Market Overton	3·22	XX.	Dunmanway, The Rectory..	11·80
,,	Market Rasen	2·16	,,	Cork	7·02
,,	Bawtry, Hesley Hall	2·30	,,	Darrynane Abbey	9·03
VIII.	Neston, Hinderton Lodge...	1·76	,,	Glenam [Clonmel]	7·42
,,	Southport, Hesketh Park...	3·43	,,	Ballingarry, Gurteen	3·65
,,	Chatburn, Middlewood	5·88	,,	Miltown Malbay	5·07
,,	Cartmel, Flookburgh	5·99	XXI.	Gorey, Courtown House ...	2·73
IX.	Langsett Moor, Up. Midhope	4·93	,,	Moynalty, Westland	3·92
,,	Scarborough, Scalby	3·85	,,	Athlone, Twyford	3·39
,,	Ingleby Greenhow	4·10	,,	Mullingar, Belvedere	3·28
,,	Mickleton	4·57	XXII.	Woodlawn	4·81
X.	Bardon Mill, Beltingham ...	3·91	,,	Westport, Murrisk Abbey..	...
,,	Ewesley, Fallowlees	3·86	,,	Collooney, Markree Obsy..	4·59
,,	Ilderton, Lilburn Cottage...	3·24	,,	Mohill	3·95
,,	Keswick, York Bank	8·68	XXIII.	Enniskillen, Portora	...
XI.	Llanfrechfa Grange	8·37	,,	Warrenpoint, Summer Hill.	2·87
,,	Treherbert, Tyn-y-waun ...	12·68	,,	Banbridge, Milltown	2·65
,,	Carmarthen, The Friary....	5·36	,,	Belfast, Springfield	4·28
,,	Castle Malgwyn [Llechryd].	4·43	,,	Bushmills, Dundarave	3·91
,,	Plynlimon	10·90	,,	Stewartstown, The Square..	3·47
,,	Crickhowell, Ffordlas	6·00	,,	Killybegs	7·59
,,	New Radnor, Ednol	6·05	,,	Horn Head	5·22

METEOROLOGICAL NOTES ON DECEMBER, 1907.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Temp. for Temperature; Max. for Maximum; Min. for Minimum; T for Thunder: L for Lightning; TS for Thunderstorm; R for Rain; H for Hail; S for Snow.

LONDON, CAMDEN SQUARE.—The most prominent feature was the absence of low temp.; the mean temp. was 42°·0, or 2°·8 above the average, and the mean shade min. 37°·6, or 3°·2 above the average. Heavy R fell during the second week, but the latter half of the month was generally dry although extremely sunless. Total duration of sunshine 23·4* hours, of R 57·1 hours.

CROWBOROUGH.—R ·99 in. above the average. Comparatively mild till 23rd, with frequent gales during the first fortnight. The last 8 days were cold, with keen E. and N.E. winds. Mean temp. 40°·1, or 1°·1 above the average.

WEST DEAN.—Mild and wet, with R double, and mean temp. nearly 3° above, the average. From 24th to the end was dark and gloomy.

TORQUAY.—Mean temp. 45°·6, or 2°·0 above the average. Duration of sunshine 48·4* hours, or 5·2 below the average.

CLIFTON.—Except 1876 the wettest December in 52 years. Heavy R fell every day till 13th. The last week was dry and cold, with E. winds.

BOLTON.—Remarkably dull, only 3·2* hours of sunshine being registered, or 9·6 below the average; 26 sunless days. Temp. above the average for the first three weeks, after which the wind changed to E. and the temp. fell 10°. Mean temp. 39°·7, or 0°·7 above the average.

SOUTHPORT.—Mild and wet till 23rd; afterwards colder and very dry with E. wind. Mean temp. 40°·2, or 0°·6 above the average. Duration of sunshine 35* hours, or 3 above the average. R ·45 in. above the average; duration 48·3 hours.

HULL.—Almost sunless, the total duration being only 3* hours. Frequent R and mist. Dense fog on 18th, 23rd and 24th.

HAVERFORDWEST.—A stormy month, mild till 22nd, after which frost was much needed to check vegetation. Duration of sunshine 36·6* hours.

DOUGLAS.—An almost unbroken period of heavy R or gales to 23rd, the land being full of water. Afterwards violent E. gales causing great dislocation of the cross-channel mail services; these still showed no signs of abating at the end when the weather was extremely cold.

COUPAR ANGUS.—The most persistently wet month of the year. Mean temp. 35°·8, being normal.

ABERDEEN.—Dull and wet with little frost, and no S. Wind, chiefly W., S.W., and S.

DRUMNADROCHIT.—R 1·18 in. below, and rain days 1 above, the average of 21 years. R fell on each of the first 23 days, but the last 8 were dry and frosty. There was no S.

CASTLETOWN.—Fresh and open throughout. There was practically no S.

CORK.—R 2·57 in. above the average. Prevailing winds S.W. and E.; gales from N.W. on 13th, and from S.E. on 25th and 26th. Dense fog on 23rd. S on 2nd.

DARRYNANE.—R 63 per cent. above the average of 28 years, and the heaviest for December in that period. On the whole it was mild, but the last 5 days were very cold.

MILTOWN MALBAY.—Miserably cold and wet ending with a blizzard on 27th.

DUBLIN.—Cloudy and dull, with frequent but not excessive precipitation. Very mild from 16th to 22nd, followed by strong S.E. and E. winds, and bitterly cold in last week. Mean temp. 43°·0, or 1° above the average.

KYLEMORE.—Remarkable for much S and sleet, with a considerable amount of black frost towards the end, with strong E. winds.

MARKREE OBSERVATORY.—R fell continually till 26th, with frequent H, sleet and gales at times. S on 30th and 31st. Temp. about the average, but bright sunshine deficient.

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* Campbell-Stokes.

Climatological Table for the British Empire, July, 1907.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Date.	Absolute. Minimum. Temp.	Date.	Average. Max.	Min.	Dew Point.	Humidity.	Absolute. Max. in Sun.	Min. on Grass.	Total Rain. Depth.	Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
London, Camden Square	78·1	19	42·3	11	70·0	51·3	52·2	77	122·9	39·9	1·96	15	7·0
Malta	...	...	...	...	...	...	...	...	...	...	...	...	...
Lagos	86·0	1	68·5	30	81·8	73·3	73·1	86	158·0	63·0	20·08	25	8·7
Cape Town	79·4	9	37·0	3	65·8	45·4	46·5	69	...	...	1·38	3	3·8
Durban, Natal ...	83·1	17	46·1	8	74·0	52·2	...	...	133·1	...	·16	5	1·8
Johannesburg	65·1	19	29·6	4	59·3	40·3	37·3	69	132·8	23·1	·00	0	0·8
Mauritius	77·0	5	54·8	22	73·5	60·9	58·2	73	135·9	46·0	·33	9	5·9
Calcutta...	92·1	19	74·6	8	89·5	79·4	78·3	85	154·9	72·7	8·16	16	8·6
Bombay...	89·1	10	73·5	24	84·8	78·0	76·9	86	134·1	71·8	59·26	26	8·5
Madras	100·8	14	75·0	9	96·0	78·7	73·6	69	143·5	72·8	2·80	11	5·9
Kodaikanal	67·2	11	49·7	30	62·7	52·7	51·9	85	136·8	43·1	3·90	26	7·6
Colombo, Ceylon ...	87·3	9	72·2	13	85·5	77·0	74·0	81	146·3	72·0	8·71	14	7·4
Hongkong	90·2	16	74·7	17	87·1	79·1	75·4	80	141·6	...	7·39	15	7·2
Melbourne	65·4	26	31·1	19	55·2	41·3	40·8	78	116·2	23·6	2·17	11	6·0
Adelaide	69·3	31	36·1	18	58·8	44·8	44·8	79	120·9	31·8	2·81	20	6·5
Coolgardie	75·5	17	34·4	10	62·1	42·9	41·9	66	139·9	27·5	1·07	11	5·4
Sydney	66·3	22	37·9	14	59·7	44·6	41·2	77	98·9	28·0	·37	14	3·4
Wellington ...	59·0	31	34·0	11	51·6	42·2	38·2	76	94·0	26·0	3·75	13	5·8
Auckland	61·0	2	39·0	10	55·9	46·4	46·0	83	112·0	35·0	6·33	19	6·4
Jamaica, Negril Point.	91·0	12	69·2	5	88·0	71·9	71·8	72	...	...	3·90	15	6·1
Trinidad	...	...	...	...	...	...	...	...	...	...	...	...	...
Grenada	85·0	16,26	70·0	20	83·0	73·5	71·2	80	141·2	...	10·73	26	5·5
Toronto	90·0	16	48·1	4	80·7	57·8	...	...	106·5	44·7	2·03	...	4·3
Fredericton	87·8	17	46·0	29	73·9	55·0	...	80	...	...	3·50	12	7·1
St. John's, N.B. ...	76·5	4	49·5	2	66·9	54·8	...	...	...	...	4·33	18	...
Victoria, B.C.	87·1	30	46·7	5	...	...	...	...	...	...	·39	2	3·0
Dawson	88·5	31	38·0	5	72·3	45·6	...	...	...	...	1·93	11	5·7

LAGOS.—3·63 in. of R fell on the 18th.

JOHANNESBURG.—Bright sunshine 308·12 hours.

Mauritius.—Mean temp. of air 0°·5, of dew point 1°·2, relative humidity 2·3 per cent., and R 1·91 in., below averages. Mean hourly velocity of wind 10·9 miles, or 1·1 mile below average.

MADRAS.—R 28 per cent. below. Bright sunshine 132·0 hours. TSS on 4 days.

KODAIKANAL.—Bright sunshine 101 hours.

COLOMBO.—Mean temp. of air 80°·5 or 0°·2 below, of dew point 0°·7 above, and R 4·09 in. above, averages. Mean hourly velocity of wind 8·1 miles. TS on 12th.

HONGKONG.—Mean temp. of air 82°·5. Bright sunshine 210·5 hours. Mean hourly velocity of wind 10·3 miles. R 5·94 in. below average.

Adelaide.—Mean temp. of air 0°·3 above, and R ·24 in. above, averages.

Sydney.—Mean temp. of air 0°·1 below, and R 4·10 in. below, averages.

Wellington.—Mean temp. of air 0°·7 below, and R 2·25 in. below, averages.

Auckland.—R 1·50 in. above the average. A wet and stormy month. Heavy gales doing much damage on 2nd, 3rd, 20th and 21st.